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J. S. GAMBLE, M.A., F. L. S.,

CONSERVATOR OF FORESTS, AND DIRECTOR OF THE FOREST SCHOOL, DEHRA DÚN.

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THE

INDIAN FORESTER.

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Notes on the tour of the Forest School students in the Western Dun and Saharanpur Siwaliks in 1894.

By H. G. BILLSON.

On Monday, January 5th, the plains tour of the Junior Forest students was started by a visit to the boom at Dakpathar. The work here was in full swing, sleepers coming down regularly and in large numbers. Drawings were made of the boom sections, windlasses and tramway, and a full description of the boom and its working given to the students.

The boom itself has been previously described in this Journal, so it need not again be referred to except to say that it was in excellent working, and that the catching of the timber was being well and efficiently performed.

The Kalsi Coppice with Standards.

The forest lies on the outer spurs of the Himalaya around the town of Kalsi in the angle formed by the junction of the Tons and Jumna rivers, and abuts on its eastern side on the main road from Saharunpur to Chakrata. The area managed under this system forms a Working Circle of three blocks.

The first, or Haripur Block, consists of 18 compartments; the second, or Panjgaon Block, of 6 compartments; and the third, or Barabagh Block, of 4 compartments. Of these, six compartments lying in Haripur and Barabagh, of an aggregate area of 788 acres have been excluded from the coppice area which is, without this part, sufficient for the present demand. A part of this uncoppiced area being near Kalsi, and the rest much grazed over by the cattle of Haripur, the closing of these areas would cause much inconvenience to the people of those places. The remaining area of 1,094 acres is treated under the coppice with standards system, with a rotation of twenty years, which indicates an annual coupe of approximately 54 acres. It may, however, here be mentioned that an area of 104 acres in compartment 3, Barabagh, cannot be coppiced owing to the friable nature of the soil and the possibility of landslip.

The soil is a dry, somewhat shallow sand, strewn with blocks of micaceous sandstone and quartzite. If in future it is considered desirable to increase the rotation, it can be done by bringing some of the area at present excluded, under the coppice system. As the areas coppiced are to be closed to grazing for the first five years after exploitation, this will give a total of 271 acres closed at any given time, which is one-seventh of the forest area near Kalsi, and therefore cannot be considered excessive.

The annual coupes have been arranged not so as to follow each other on the ground in regular succession, but so as to avoid the inconvenience of closing the whole of 5 years' coupes in one spot, and also to avoid the possibility of coppicing a large area of Sal one year, and perhaps none the next, as Sal is not regularly distributed over the whole area. Speaking generally, the area is incapable of producing good, high-timber forest, on account of the very shallow, stony nature of the soil, while at the same time it is most desirable to get rid of the present stock of unsound and crooked trees which have no future before them. This it has been decided to do by leaving the few well grown trees at present standing on the area, and coppicing all such as are badly shaped and poorly grown. For standards, Sal, Sain, Haldu, Gausam and Bakli, with a few others in default of these, are preferred. There are certain free grants of timber or bamboos which have to be met, and this is done, as far as possible, from the excluded area before mentioned.

It was laid down in the Working Plan that in 1889-90, 53 acres in compartment 7 were to be cut over, in 1890-91 37 in compartment 6, and in 1891-92, 33 acres in compartment 5. Owing, however, to difficulties connected with the demand, none of these areas could profitably have been exploited: they were, therefore, left over till 1891-92, when a market for the produce was opened up at Chakrata, and the wood was sold for fuel to the cantonments at that place. In 1891-92, an area of 80 acres in compartment 7 was cut over and yielded 350 cu. feet of timber and 20,540 cu. feet of fuel. This compartment, the total area of which is 53 acres, occupies the N E. slopes of a spur between the cartroad and the foot-path to Kalsi. Its average gradient is about 35°. Sal is abundant: and the standards, which are very few in number, are chiefly Sal, with here and there a Bakli or Haldu. The scarcity of standards is due to the difficulty of finding suitable trees.

The wood was cut departmentally at a cost of Rs. 2 per 100 cu. feet of fuel (cut in 2 foot lengths.) The stools were gone over afterwards, and trimmed by daily labour at a cost of Re. 0·15 per acre. The cost of carriage to Chakrata, where all the fuel is now sent, was Rs. 1 per 100 cubic feet from the jungle to the road, and Rs. 15 from there to Chakrata by cart. In the cantonments the wood was sold at Rs. 27 per hundred cubic feet. The stools are not very well cut, but the results are, on the whole, good.

The measurements of shoots by the students of the Forest School gave :—

January 1893 :—1,016 shoots of an average height of 6 ft. 5½ inches (of which 347 were Sal of an average height of 7 ft.)

January 1894 :—461 shoots of average height of 9 ft. 1 in., of which 179 were Sal of an average of 9 ft. 1 in.

It was discovered that *Combretum decandrum*, the common climber, has begun to do considerable damage, being especially thick in the lower part of the compartment.

In 1892-93 28 acres of compartment 6 were coppiced, and measurements made there in January 1894 resulted in the following :—

670 shoots of an average height of 6 ft. 4 in., of which 179 were Sal of an average of 6 ft. 7 in.

In the same year nine acres more of compartment 7 were cut over, the two areas yielding 431 cubic feet of timber (sold locally).

19,806	...	...	... firewood.
1,214	...	...	... charcoal.

With the exception of the cost of carriage of material from the coupe to the road, which varies with the distance to be traversed, and that firewood now fetches Rs. 25 per 100 cubic feet in Chakrata, the rates are the same as those quoted above for 1892.

This compartment has a Southern aspect and a drier soil than No. 7, with about the same slope as the latter.

On Saturday, January 13th, the Badshaibagh coppice was visited. This area lies on the southern slopes of one of the outer ranges of the Siwaliks, about one mile to the west of Badshaibagh, which is a small hamlet lying at the point where the road from Saharunpur to Chakrata enters those hills. Its northern boundary is the ridge of the outer hills, its southern the Badshaibagh Rau, which latter also defines it on the east, and its western boundary is another ridge. The soil is dry, poor and stony, and the subsoil is pebble bed or sandstone, with in a few places a band of red clay.

Two areas of 50 acres each were cut over, one in 1888-89 and the other in 1889-90 The financial results were, however, so poor that the system was abandoned. These areas were both cut over departmentally, and the wood was auctioned on the spot. The areas are still fire-protected, and the effects of the exclusion of grazing were very noticeable in comparison with the adjoining open jungle. The chief species noticed were Bakli (*Anogeissus latifolia*), Harsinghar (*Nyctanthes arbor-tristis*), *Zizyphus* of different species, Khair (*Acacia Catechu*), Tendu (*Diospyros melanoxylon*), Salai (*Boswellia thurifera*) &c., &c.

Measurements by the students have yielded the following data :—In 1892, in part of the area cut over in 1888-89 the measurement of 424 shoots gave an average height of 7 ft. 5 in.

In 1893 the same area gave for 553 shoots an average of 8 ft. 3 in., and in 1894 589 shoots gave 9 ft. 1 in. A visit to the areas was, however, useful as affording an example of the results of coppicing a piece of jungle of poor nature on a hotdry slope.

The results are in places not bad, the condition of the crop having evidently been improved by the operation and the growth seen from a distance being already indistinguishable from the neighbouring jungle.

Passing along the foot of the Siwaliks eastwards from Badshaibagh, through the much overgrazed scrub jungle, which abounds along the edge of the Gangetic plain, the characteristic shrubs and trees of these areas were pointed out to the students. Three species of *Zizyphus*, namely, *Jujuba*, *Oenoplia* and *xylopyra*, also *Carissa Carandas*, were specially abundant. In the dry and stony soil of the Raus wherever a slight rise in the bed had left the soil fairly free of large stones, the curious Asclepiad *Orthanthera* was the first and almost the only plant to appear. In such places as had been raised above the level of the stream for a somewhat longer period, a considerable young growth of Khair (*A. Catechu*) was noticed to have sprung up. Associated with this at the sides of the Raus growing on the same poor sandy soil, were found Shisham (*Dalbergia Sissoo*), *Acacia eburnea*, *Mimosa rubicaulis*, and *Odina Wodier*, the Jhingan, the results of the tapping of which latter for resin were very noticeable in the formation, after constant repetition of the operation on the same spots for a number of years, of large lumps or excrescences on the tree.

Rising from the Rau beds to the summits of the hills the following trees were noticed :—*Buchanania latifolia*, Bakli (*Anogeissus latifolia*), Sain (*Terminalia tomentosa*), Khair, Aonla (*Phyllanthus Emblica*), Dhaura (*Lagerstræmia parviflora*), Salai (*Boswellia thurifera*), *Zizyphus xylopyra*, &c., and uppermost of all the Chir Pine (*Pinus longifolia*). At Barkala very serviceable kind of Forester's quarters have been built. It consists of three rooms with a yard behind. The total cost was only Rs. 560.

The next place of interest visited was the Sahensra coppice. This is an area situated at the southern boundary of the forest on the flat country at the foot of the hills. At its western end it abuts on the Sahensra Rao, and cuttings are travelling in an easterly direction. The coppice was only started in October 1893, and forty acres were laid down as the first year's coupe. These are now being cut over by the purchaser, who has paid Rs 80 for the whole produce. This, as all cutting and extraction are done by the purchaser, represents the net profit accruing to Government. A belt of one chain has been left along the boundary for the sake of protection from the encroachments of animals passing along the road.

Except certain Pipal and large hollow trees, from which shoots are neither expected nor wanted, it is made a rule that all trees must be cut flush with the ground, and to the credit of the contractor it must be said that the work could not possibly have been done better or more thoroughly. The shoots were absolutely

flush with the ground, smoothly cut and domeshaped. The species were :—

Godgudàla (*Sterculia villosa*), Khair, Kharpat (*Garuga pinnata*), Tendu (*Diospyros melanoxylon*), Aonla (*Phyllanthus Emblica*), Kura (*Holarrhena antidysenterica*) Papri, (*Ulmus integrifolia*), *Odina Wodier*, Bael (*Aegle Marmelos*) *Zizyphus* several species, Salai (*Boswellia thurifera*) &c., &c.

Among these, the best shaped trees, of whatever species, are left as standards. The coppice is made in very inferior scrub jungle, but in the end it will have an extremely beneficial effect by substituting for a crop of crooked misshapen trees, bringing in almost no revenue, a coppice wood of tall shoots suitable for a number of purposes. The rotation will be twenty years, but the Working Plan is not yet completed. The demand at present points to such a rotation for the production of fuel which is being taken to Saharunpur.

On Thursday, January 18, camp was moved to Mohand, and part of the coppice was visited, but at Mohand owing to four days' extremely heavy rain, work was rendered impossible, and the thoroughness of the inspection consequently was in a measure curtailed.

Short account of the Budhaban Coppice near Mohand.

The hamlet of Mohand lies at the southern extremity of the pass of that name, and the coppice is on either side of the Saharunpur-Dehra road, in the plain to the south of the village. The area is bounded on the north-east and north by the forest road from Badshaibagh to Hurdwar, on the south-east by the Mohand Rau, on the south-west by a belt of a forest, and on the north-west by the Khajnaor Rau. The coupes are divided by 10 ft. paths ; the ground is level, being part of the Ganges plain ; and the soil to the north is fairly deep, becoming, however, poorer as we procced southward. The subsoil consists largely of boulders, and is in great part old river bed. With regard to the growing stock, Sal is fairly abundant in some compartments, chiefly towards the north, the remainder consisting of inferior species. The Working Plan provides that from 75 to 80 acres are to be cut annually. The coupes are numbered from north to south in three parallel rows, so that No. 1 being on the north-east corner, No. 2 is directly to the south of it, and No. 20 occupies the south-west corner of the area. Until last year the coupes were cut up to No. 5 in regular succession, but since the *operation* of the Working Plan, they are being cut alternately, so that No. 7 will next be exploited. Up to No. 4 inclusive the compartments were cut departmentally. From No. 4 they have been cut by the purchaser. The wood is sold by auction in August, and the purchaser must remove it by March, a month's grace being, however, allowed in cases where the removal was unavoidably delayed.

In No. 4 the standards were very badly marked, the fault of the Range Officer, who had mutilated the trees in the marking, and in that compartment in December last 150 teak and 100 Mohwa with a few Chir pine have been planted in baskets in the blanks, the Chir especially doing very fairly well.

A small table of the yield and the revenue and expenditure is here inserted :—

Compt.	Date of cutting.	Area in acres.	Number of standards left.	Number of trees cut.	Expenditure.	Revenue. (*net*)
					Rs.	Rs.
1	Nov. 1888	70	926	27,873	264	600
2	„ 1889	70	2,448	24,267	252	660
3	„ 1890	70	none.	22,323	238	605
4	„ 1891	80	1,400	no record	391	1,000
5	„ 1892	75	665	...	...	630
7	„ 1893	75	865	...	...	535

Nos. 5 and 7 having been cut by purchasers the item of expenditure disappears. In Nos. 1 and 2 in 1893 it became necessary to cut the creepers, which was done by contract at a cost of Rs. 35.

Results of measurements made by students :—

No. of Compt. in which measurement taken.	Date of measurement.	No, of shoots measured.	Av. Ht. in feet.
1	Jan. 1892	274	10′-0″
2	„	281	9′-0″
3	„	581	6′-5″
2	Jan. 1893	940	12′-3″
3	„	849	7′-11½″
3	Jan. 1894	782	9′-5¾″
4	„	807	8′-9¼″

After two years' growth, the shoots reach such a height that measurement is difficult. It will be noticed from the table that comp. 3, lying as it does to the south, gives poorer results for the same age than either 1, 2 or 4 which lie to the north of it.

On leaving Mohand for Dholkhand a very useful and effective forest bridge made of rough cribwork was shown to the students, and sketches were made and dimensions taken.

Improvement Fellings in the Saharunpur Division.

These have been made over varying areas containing Sal since 1884. The fellings are made primarily with a view to improving the condition of the Sal and Sain found in these areas by removing trees interfering with their growth, and also with a view to getting rid of badly grown and unpromising trees of all species. These are not, however, the sole objects. The operations differ from those being done in the Dún, in that all, or nearly all, the trees cut, are coppiced with a view to obtaining a re-growth in the areas from which the trees are removed. These coppice shoots will not interfere with the trees already on the area, and will in time help to complete the crop, and where this is young, as it very generally is, the coppice will in time give, with the trees left standing, a much more even aged crop than is now on the ground. In Lakarkot the coppice shoots from stools cut in 1885 are now hardly distinguishable from the rest of the crop. Sal poles of a foot in girth and over up to 1 ft. 5 in. are plentiful, and most of them over 30 ft. high. Kokat is also good, and many of both are evidently from pretty old stools. The beneficial effects of these operations were well seen in the Lakarkot block which was visited by the students on the march. The tendency of the fellings is to produce a less pure crop than under the Dun system, and this is a distinct advantage.

In 1892, about 250 acres were gone over in the Dholkhand blocks, climber being cut in the same year. Last year a nearly equal area was cut in the Andheri block, the climbers being cut the previous year. This year 400 acres in Gaj and 200 in Baniawala are being gone over, 3,945 trees of all sorts having been marked and cut departmentally and sold by auction for Rs. 860. The climbers do not, however, appear to have been cut, which is to be deprecated, as they are rather abundant.

Revenue System followed in the Saharanpur Division.

This was explained at length to the students on their visit to the Mohand revenue chauki on Friday, the 19th January. With regard *first* to the various sources of revenue of the chauki, we have first timber from improvement fellings, *secondly* coppice, and *thirdly* sales of standing trees previously marked up to a paid maximum per block to contractors and others. Villagers may also remove small quantities for personal use, on tickets taken at the chauki. Firewood is sold on tickets taken by purchasers at the revenue chauki, and also is the produce of coppice areas, thinnings and clearings such as lines, roads, &c. Grazing is also permitted on permit, which may be given for one year or for less periods down to a minimum of one month. Some of the grazing dues are realized by the Collector of the District at the various tahsils. Bamboos are worked by a system of blocks which will be explained elsewhere. These blocks are either leased to contractors or are cut

departmentally. Grass and other minor forest produce is removed on contract, a lease for removal being given by blocks from the 1st October to the end of February. This lease may refer to all kinds of grass, fruits, thorns for fencing, fibres from climbers not from trees, &c. Gums and lac are leased separately, as are also honey and wax, horns and hides, and stone for building. Leases are not allowed to be taken on a minor forest produce contract. After the expiration of the leases, that is at the end of February, all the above mentioned produce is sold in small quantities on tickets issued from the chaukis, chiefly to supply the wants of villagers in the neighbourhood. At each revenue chauki there are two Forest Guards (here at Mohand, owing to its extensive business, there is also a Forester) whose duty it is to issue passes, usually up to the hour of 9 A. M., after which time they must patrol, returning in time to check the passes in the evening on the return of the holders. As has before been mentioned, persons wishing to remove, as a rule, small quantities of fuel, &c., are given tickets. These tickets are of six kinds, each kind of a different colour.

Brown	tickets,	for	the removal	of produce,	to the
		Do	do	value of 6	pies
White	tickets	Do	do	value 9	pies
Yellow	tickets	Do	do	value 1	anna
Red	tickets	Do	do	value 2	annas
Blue	tickets	Do	do	value 3	annas
Purple	tickets	Do	do	value 4	annas

These tickets are merely stamped on sheets of paper, sixty-four going to each sheet, and are issued from the Divisional Office at Dehra. The colours of these tickets are annually changed, which system has its disadvantages, as the ability of the buyers to recognize the value of a ticket from its colour is a useful means of proving that the Forest Guard is giving them the value of their money. On the back of the ticket is written twice over, its current number, the date, name and residence of the purchaser, the block for which it is available, and the kind of produce and its value. Half the ticket is torn off when the remover returns from the forest, and these half tickets, together with the revenue collected and the "Chalan" are sent to Dehra. Each pass or ticket issued is entered in a register, and a daily total of those issued is written up in a second register, in which latter are also placed the receipts for tickets sent to the Head Office. An abstract of the second book must be sent in to headquarters every month. Every week the Forest Guard at the Badshaibagh chauki despatches his revenue together with the half-tickets he has collected to the Mohand Office, entering at the same time in a receipt from the amount of his revenue remitted, and the Guards at all the other chaukis do the same. When all have arrived at Mohand the Forester opens all the envelopes, and prepares a treasury receipt form or "Chalan" for

the whole lot, which is then sent with the half-tickets and revenue to Dehra. There the treasury receipt is made out at the Divisional Office in duplicate, one to remain at the Treasury and the other for the Divisional accounts. To persons wishing for a longer currency of permit than one day, which is usually the case for larger amounts of produce than those removed on tickets, passes are given. Passes are made out in triplicate and bear on their reverse sides information identical with that written on the tickets. One copy of the pass remains in the pass books and the second is taken from the remover on his return from the forest, the third remaining with the purchaser just as the half tickets did. The issues of these passes, which are all of the same kind, and the value of which is fixed by the entries made in it only, are also entered in the general register along with the issues of tickets. The counterfoils are treated in the same way as the half-tickets, and the revenue obtained is sent in along with that obtained from the tickets.

The Dholkhand Sample Areas.

Sample plots are especially useful in India for trees which do not form distinct annual rings. Here the rate of growth must be ascertained by careful periodical measurement of individual trees. Where the factors of the locality differ considerably, the results taken from one sample plot cannot be applied over the whole area of a district, and a different area must be chosen in each different part, from which to draw conclusions. The larger the number of trees in the given area, the more accurate and reliable will be the data yielded. Without knowing approximately the rate of growth of a crop, the compilation of a Working Plan is impossible, as there is no means of forming an idea of the yield. At Dholkhand three areas are set apart in an averagely stocked part of the forest, with a view to ascertaining the rate of growth of Sal in this district. Each plot is surrounded by a trench.

Numbers 1 and 2 are each 200 feet square, the third area is half an acre. The first area was started in 1882, No. 2 in 1888 and No. 3 in 1890. All the trees to be measured are numbered with a small zinc label, and a ring is painted round the tree at about four feet from the ground, at which point all the measurements are taken. Area No. 1 is not thinned. No. 2 was heavily thinned when selected, only the best trees being left, the growth in girth of these being on that account much greater than in No. 1. Area No. 3 was thinned lightly in 1890, only certain trees being reserved for measurement. The growth in girth here may be expected to be more than that No. 1, but sufficient time has not yet elapsed to enable reliable conclusions to be drawn.

The measurements for the past few years have been conducted by the students, and this year the results were as follows :—

Sample plot No. 1 :—148 trees gave an average girth increment per tree per annum, calculating for eleven years, of ·46 in.

No. 2 :—96 trees for six years gave ·74 in. per tree per annum.

No. 3 :—44 trees for four years gave ·54 in. per tree per annum.

This last result being probably slightly smaller than the correct one, as the area was first measured in April 1890. The present age of the trees on the area is roughly 20 to 25 years, which estimate of the age is to some extent borne out by history, as the forests of the Saharanpur Division were taken over and fire-protected about 1870.

The Tira Coppice.

On January 26th the camp was moved to Beribara, where the Tira coppice was visited. This area lies to the south of the Badshaibagh, Hardwar road and to the west of the Betban Rau. The coppice consists at present of eleven coupes, which up to the present have been laid out as they were taken in hand. The coupes are all marked off by a ten-foot path. No. 1 is towards the north nearest to the Forest Bungalow, and the area stretches as a long strip to the south of this. The areas are marked by numbered posts at each corner. They are fire-protected and closed to grazing, and three years ago the climbers were cut in coupes 1 and 2. This year the climbers in Nos. 1, 2, 3, and 4 have been cut at a cost of Rs. 10 per coupe of 75 acres. In 1888, the first five compartments were overrun by fire, which, however, did little damage in No. 5, as it was then but just exploited.

The following table shows the financial results of the undertaking :—

No. of coupe.	Area in Acres.	When cut.	No. of Standards left.	Expenditure Rs.	Revenue (net.) Rs.
1	75	1883-84	100	...	40
2	75	1884-85	200	...	145
3	75	1885-86	250	...	305
4	75	1886-87	300	...	400
5	75	1887-88	300	199	620
6	75	1888-89	978	100	420
7	75	1889-90	none	...	265
8	75	1890-91	...	...	300
9	75	1891-92	...	...	400
10	75	1892-93	...	...	380
11	75	1893-94	737	...	410

Nos. 1 to 4 inclusive were cut by contract, but this being found unsatisfactory, the operation in Nos. 5 and 6 was carried out departmentally, after which the coolies having become more skilful, the work was again allowed to be carried out by the contractor who purchased the coupe.

Bamboos in the Saharanpur Division.

Formerly there were 16 blocks in this Division which yielded bamboos, and these were divided into three groups, one containing six blocks and the other two five each. One group was cut over each year, all the culms, which were more than one year old. being cut out and the new ones left. At present, however, they are grouped in the following manner :—

In the Western Range there are two blocks, Mohand and Khajnaor, to be worked departmentally, one each year. In the Central Range there are nine blocks, of which three are worked departmentally, one each year, namely Bam, Sukh and Chillawala. The remainder are leased for working, two in each year, namely Gaj and Andheri, Betban and Dholkhand, Golna and Maliwala. In the Eastern Range different conditions prevail. The Maiapur block has to be annually opened to supply the demand of Hardwar pilgrims for holy water baskets, the makers living for the most part at Jwalapur. These men are allowed in on ticket, half the block being opened to them each year. The Ranipur block is worked departmentally every year, and the other three blocks, namely Harnaul, Chirak and Rauli are leased. A few clumps flowered in Ranipur block in 1891-93. The bamboos in Maiapur block, are often solid owing to the poor soil of that block. After cutting, the tops and side branches are taken off and used for fencing, the rest go to Hardwar where they are sold to the pilgrims as walking sticks, for only young bamboos can be used for the baskets previously mentioned. In the Rauli block the bamboos flowered and seeded in 1884-86. Regeneration was not successful owing to constant grazing, consequently only those seedlings which were protected by being under thorny bushes survived. Last year about sixty acres of this block were gone over and the thorny bushes over the young culms were cut back, the effect being markedly beneficial. In the Chirak block, there was a partial seeding which occurred in 1886-87, so that a fair number of clumps dating from that period are seen on the ground, intermixed with much older clumps which have not yet seeded.

With regard to the exploiting of those bamboo clumps, which are being done under departmental supervision, the following facts may be noted :—

The contractor undertakes to cut within one foot of the ground, leaving all bamboos of a year or less, and in cases where there are not enough young ones he leaves a few older ones, so that there should never be less than four in a clump. He is paid at the rate of two or one annas per score according to the

kind of bamboo. All bamboos are brought to the depôt by the rangers house. The kinds of bamboos are as follows :—

1st.—"Chr kalans," about three inches in girth, all solid, and consisting of the full length of the culm, used for roofing, flags, &c.

2nd.—"Saranchas," which are larger and hollow, with greater girth than the last, and 10 to 12 feet long, the rest being cut off. These are for spliting for trellis work, baskets, &c.

3rd.—"Bahis," which may be hollow or not, are rather thicker than Saranchas, and are about seven feet in length. They are used for cots, &c.

The cost of these first three is two annas per score.

4th.—"Chr khurds," less than "Chr kalans," otherwise similar, used for roofings, fishing rods, &c.

5th.—"Lathis" about the same as the last, but only five feet long and used for walking sticks.

6th.—"Rakmi bans," which are the tops of 2, 3 and 5, and are used for fencing, roofing, bottoms of carts, &c.

The first three kinds sell by auction for 6 annas per score ; "Chr khurds" and "Lathis" for four annas, and "Rakmi bans" for three annas per score.

The contractor is also paid at rates varying from one anna to 6 pie per score, according to distance, for the carriage of the bamboos from the jungle to the depôt.

The Ranipur Coppice Area.

This is very similar in character and management to the rest of the coppice areas in the division. It is bounded on the east by a cut line, on the south by the forest boundary, on the west by the Ranipur Parao and the Rauli block. The area hitherto worked has been gone over from east to west, on the south side of the outer hills of the Siwailks.

The crop is somewhat inferior, with a little Sal in places, notably in the small concavities of the hill sides. The most important product is bamboos, which are spread all over the area. The rotation is, as usual, 20 years. The area is fire-protected and closed to grazing, the rest of the forests around being heavily grazed. About 1,180 acres are set aside for coppice, and as yet the coupes are laid out annually as they are cut. Up to 1892, the work was done departmentally, but last year it was placed in the hands of a contractor. The whole Working Circle will consist of seven coupes on the east side of the Rani Rau, which runs through the area, numbers 1 to 4 being on the south face of the outer hills, and 5 to 7 on the north side. Five more coupes will lie between the Rani and Rauli Raus, and eight more between the latter and Chirak. As has been before mentioned, special attention is paid to bamboos and offsets, and seedlings have been freely planted in coupes 3 and 4. Unfortunately, many of the offsets were taken from old clumps, which subsequently fruited, and they have consequently themselves seeded and will die down.

The following is a table of results:—

No. of coupe.	Date of cutting.	Area in acres.	No. of Standards left.	Revenue.	Expenditure.
1	Nov. 88	55	955	215	162
2	„ 89	55	850	210	103
3	„ 90	40	none	185	160
4	„ 91	57	none	241	241
5	„ 92	55	400	1,000	500
6	„ 93	55	1,327	300	Contractor.

It may here be remarked that in coupes 3, 4 and 5 a certain amount of cultivation was allowed in order to get the ground broken up for planting with teak and bamboo. The teak seed is obtained from the trees on the banks of the Ganges canal. The students spent several days in coppicing in compartment 7, and in cleaning bamboos in compartment 2.

Insect Pests in the Goalpara District.

The year has been rife in insect pests, and vegetation of all descriptions has suffered more or less, though no information has been received about damage done to cereals. From one end of the district to the other, trees exhibit total or partial defoliation, or show their leaves in strips or containing egg cells. In a minor degree the Orthopterous Mantis on *Dalbergia Sissoo*, the Hemipterous Cicada on the long, newly formed blades of *Saccharum* and *Andropogon* and a Coleopterous Chrysophora on *Shorea robusta*, *Careya arborea* and various *Acacias* have done a fair amount of damage. Considerably surpassing this, is the wholesale defoliation of Sal by the Lepidopterous *Dasychira Thwaitesii*, nor has it confined its ravages to this individual tree, but has invaded all the associated species, particularly *Bombax malabaricum*, *Careya arborea* and *Dillenia pentagyna*. Their depredations include lower hill forest, and mixed plain forest, deciduous or evergreen. Small in proportion as the latter class of forest is, confined to narrow margins along banks of streams, it has not escaped the common enemy. The forest growing on an almost laterite clay, that on the richer loam of the submontane regions, that of more recent formation resulting from scourings of disintegrated igneous rocks, or that on the humus-clad surface, with a poor sandy subsoil impregnated with mica, have all suffered in

varying degrees. Pure Sal forest, however, suffered more than mixed, as did forest growing on the lighter poorer soil. The area estimated as affected cannot be less than 800 square miles, and no Sal forest whatever has escaped on the north of the Brahmaputra.

As far back as 1878, Mr. W. R. Fisher, now at Coopers Hill, reported the defoliation of 200 square miles of Sal forest by this same pest. His description of the caterpillar was not quite correct, as it is covered with long, erect, yellow hairs, with a black transverse stripe, the moth being a fluffy greyish white. It is possible, too, that he underestimated the area affected, as his observations closed early. From information collected and the writer's own observations during the last three years, it may be concluded that this insect, like the poor, is ever with us, but does not seem to have drawn much attention or comment in the interval. On a small scale, it has been known to have attacked tea bushes for years, but has not been looked upon as a very dangerous enemy. Its power for mischief has been miscalculated, however, as the sudden arrest of growth at its most active period of vitality has resulted in the death of a large number of new shoots, tender twigs and branches, and the foliage of many trees present the aspect of a severe burning. In addition to this, a year which opened with the promise of a most abundant seed supply ends with a crop, of which not more than 5% has seeded, the profuse inflorescence having suffered equally with the tender new leaves.

In May and June 1892, a few specimens of these caterpillars were observed, but heavy and continuous rain falling early in the year, possibly interfered with the further development and metamorphosis of the insect. In the following cold weather it was occasionally observed, but at about the close of March no less than 25 square miles were covered, the defoliation being complete. The operations were fragmentary, and of this area not more than 2 square miles were in one block. The insect confined itself to exposed situations, such as demarcated lines, fire lines, roads, &c., and trees growing on the poorest soils. That the affected area was not more extensive may be accounted for by the suggestion made in the Indian Museum notes that the parasites *Chalcis* (*Brachymeria*), *Euplœa*, and a species of *Perilampus* destroy the cocoons. The mere firing of the forest did not seem to retard the insect's energies much, as a portion of a Sal area badly burnt in February was not thereby excluded from the insect's favor. It is somewhat difficult to form an opinion regarding reasons for the wholesale appearance of the insect this year, but it is peculiar that like 1891-92, there was little cold weather rain followed by a long drought with very hot weather in the spring. In 1892-93, on the contrary, the rainfall was far above the average, and commenced on an extensive scale in March. It undoubtedly prevented the insect's expansion. The trees which suffered least, as far as seed-bearing is concerned, were the more mature, robust ones.

T. J. CAMPBELL.

Yield of Katha.

I had intended writing for our Journal a detailed account of the method of manufacture as practised here, in the Province of Gujrát, of *Acacia Catechu* wood extract (*Katha*, not cutch), but the necessary leisure has always failed me. As I start for Europe in a few days on two years' furlough, and my notes are likely to get mislaid in that time, I think I ought to send you at once a few figures obtained from my experiments.

6,335 lbs. of wood chips yielded 3,351 lbs. of moist katha, the weight of which when completely air-dried was 410 lbs., an outturn of 6·46 per cent. By moist katha I mean the soft precipitate, which is moulded with the fingers of one hand into small cones and put out thus to dry in the shade. To produce the above quantity of katha, 80 men and women were employed during 4 days, and 40 earthen fire-ranges, in the form of small tunnels, and having two parallel lines of three openings each in the roof for the boiling pots, were kept going from early morning until night fall. The cones were dry enough for the market about 3 weeks after the chips had been boiled.

The price of katha has been steadily rising, and I could sell in a single year all the extensive *Acacia catechu* areas of the Baroda State to the katha boiler. Last year the price of katha was Rs. 45 per 100 lbs. at the place of manufacture. In my experiment, which was possible through the kindness of the State lessee, the cost to that individual of 100 lbs. of katha was, leaving out annas and pies, Rs. 27, of which Rs. 8-8 went into the State treasury as royalty, and Rs. 18-8 to the labourers. From the balance of Rs. 18 per 100 lbs. must be deduced expenses for management, cost of journeys, pots, axes, &c., before we arrive at the profits of the lessee, which, however, do not average less than 20 per cent. on total outlay.

In this province of Gujrát, katha boiling is confined to a single aboriginal tribe, which calls itself Kathorias, from the name of their business. As a rule, they are fed and clothed (?) by the lessee, receiving a small money wage in addition calculated on the number of fire-ranges, which is also the basis for reckoning the amount of royalty.

I am glad that the Reporter on Economic Products to the Government of India has issued a separate corrected article on the manufacture of katha, for the original article in the Dictionary was a curious mixture of fact and garble, due to the authorities drawn upon having been quoted wholesale without the necessary sifting.

In sending to the Forest School last year, specimens illustrating Katha boiling in Gujrát, I suggested that it would be interesting to find out with the help of the Forest School Chemical Laboratory whether any proportion of catechin or tannic acid

still remained in the boiled wood-chips. It would also be useful as well as interesting to ascertain whether the yield of 6·46 per cent. of Katha was the maximum obtainable from the wood used; also what difference in the proportion of catechin and tannic acid exists between Gujrát Katha and that manufactured in Oudh and Kumaon.

CAMP *viâ* BARODA,
29th May, 1894

E. E. FERNANDEZ.

II.—CORRESPONDENCE.

Legal position of Water areas inside Reserved Forests.

SIR,—Will you allow me a corner in the *Forester* for the purpose of putting the following questions:—

Can a lake, or tidal water-way, a river or any surface water be constituted a reserved or protected forest under our Indian Forest Acts or Regulations? Is there, in fact, inside the boundaries, as gazetted, of a reserved or protected forest, any sheet of water, in respect of which the Government can exercise control under, say, Sections 25 and 31 of the Indian Forest Act? Suppose, for instance, that Government is proprietor of a reserved forest A free of rights, except one public right of way leading to a lake B. And further, let it be granted that the surface area of the lake has been included in the total area of the reserve as notified by Government under Section 19 of the Indian Forest Act. Lastly, Government has issued rules, under Section 25 of that Act, absolutely forbidding the catching of fish in, and the removal of any forest produce from, the reserve. Under these circumstances, can a person, who, entering the forest along the public path, proceeds to catch fish in the lake, and, let us say, lines his basket with leaves of lilies gathered from the surface of the water, be legally punished for any offence under the Indian Forest Act?

"Q."

Iron making by means of gas-furnaces.

Through the kindness of a well-informed friend I am now able to state the facts as regards the direct method of iron-making by means of gas-furnaces. Reading the article on iron manufacture in Southern India, which you reprinted in March last, one cannot help being impressed with the idea that the direct method has become an established fact, but I regret to find that this is a mistake. My friend writes as follows:—"To my knowledge the 'direct method of iron and steel making in gas-furnaces, or by

'any other means has nowhere obtained any importance, either in 'France, in England and least of all in Germany. The old works of 'Siemens at Landore are still producing sheet iron by the Siemens-'Martin process out of scrap iron, with addition of ore. In England 'and North America an addition of ore takes place when pig-iron 'is worked up in reverboratary gas-furnaces. In Germany this 'addition is very rarely made. I do not think either that in Scandi-'navia the direct manufacture of steel out of magnetite is established 'on a commercial scale. Last summer, when acting as one of the 'judges for mining and metallurgy at the Chicago Exhibition, I 'had much intercourse with Swedish metallurgists without learning 'from them about a new method. It is true that much steel is 'worked up in Sweden in Martin furnaces and in small Bessemer 'furnaces, but always pig-iron is the principle basis, and ore and 'scrap iron form only additions. Altogether, whilst at the Exhibi-'tion I heard from no quarter of any kind of development of a 'direct method. I, therefore, disbelieve absolutely any news of 'such development.".

From the above, it is clear that, apart from any processes which may exist in the experimental stage, the only direct use of iron ore has been as a supplement, and its application as such must naturally be limited. The ore serves to oxidize a portion of the alloys of the pig-iron. If we assume that 2 per cent. of silicon and 3 per cent. of carbon are to be oxidised by means of magnetite to produce silicon dioxide and carbon monoxide, we are permitted to add 23 per cent. of magnetite. The ore may thus, at the most, amount to one-fourth of the pig-iron. The promoters of the new iron industry would accordingly have to smelt three-fourths of their ore first into cast iron, or else they would have to introduce some equally costly reduction process, unless they can find out another way to utilize more of the ore in the crude state. If the promoters know of such an other way they would do well to make it public. If not, then it would be advisable for trials to be made, not in India but in Europe, at some place where all the resources of art, of machinery and of chemical industry are available. After the successful introduction of a method which would suit the special requirements of India, it would be further advisable as a final test to send a shipload of the very ore to the place of experiment, so that no doubt whatever could remain that a process had been found by which to make good and cheap steel and iron out of the Indian ore. Then, and not till then, would the success in India be assured. That the promoters of the scheme deserve every possible support is without doubt. They cannot do better just at this time when the low price of silver acts as a premium on local manufacture. The object is praiseworthy, but the difficulties are in proportion, and the promoter's motto is indeed appropriate "Gutta cavat lapidem."

H. WARTH.

Age of production of good seed.

SIR,

Can any of your readers inform me at what age or size (girth) deodar,—Pinus excelsa—spruce and silver fir produce seed *that will germinate and give rise to strong, healthy seedlings?* In the case of Chil (*P. longifolia*), trees under about 5 feet girth do not produce seed of the above description, and probably the same is true in the case of deodar, &c. I know that trees, 2 inches in diameter, of *P. excelsa*, bear cones and that sometimes coppice shoots of deciduous species seed the first year, but such seed is, of course, useless for the purpose of natural reproduction.

"SEED"

Promotion in the Bombay Forest Department

SIR,

I shall obliged if you will insert the following in your next number of the *Indian Forester*:—

A strong feeling of discontent exists amongst the covenanted officers of the Bombay Forest Department, owing to the rumour persistently current that an extension of service is about to be granted to the Honorable A. T. Shuttleworth, Conservator of Forests, 1st grade. That officer will attain the age of 55 years next October, his service in the department having extended over a period of 31 years, during 25 of which he has occupied the post of Conservator.

Any one who knows the Honorable Mr. A. T. Shuttleworth will be quite ready to admit that his untiring zeal and energy continually displayed throughout his long period of service in the interests of Government and the Department deserve some signal proof of recognition, but that that recognition should take the form of an extension of service, to the detriment of the prospects of a number of other officers already almost hopelessly blocked in respect of promotion, is most manifestly unfair.

The Bombay officers are singularly unfortunate as regards their prospects. Promotion has hitherto been exceptionally bad, and as there are only two appointments with a salary of over Rs. 1,000 a month many of the officers are so unfortunately situated that they can never hope to earn the ordinary retiring pension of Rs. 5,000 a year. What renders these disadvantages the more disheartening is the fact that the Forest Revenue of Bombay exceeds that of any other province in the empire, excepting Upper Burmah.

The following examples will be sufficient to show how unfortunately we are situated in the matter of promotion. In Bombay the two senior covenanted officers are Messrs. Macgregor and

Wroughton appointed to the Department in 1871. The former is Conservator, 3rd grade, the latter Deputy Conservator, 1st grade, both having 23 years' service. On the Government of India list of 1894 Mr. Gamble of the same year is Conservator, 1st grade, and the late Mr. Whittall was Conservator, 2nd grade. Junior to them in service, appointed in 1872, are Messrs. Hill and Popert, both Conservators, 1st grade, and Mr. Dansey, Conservator, 2nd grade, whilst in Bombay Mr. Hight of the same year is only a Deputy Conservator, 2nd grade. The difference is rendered marked by the fact that on the Government of India list two Conservatorships, 2nd grade, are held by men appointed in 1873 and 1874 respectively, and two Conservatorships, 3rd grade, by men appointed in 1876.

Another argument against the justice of an extension of service being granted to the Honorable Mr. A. T. Shuttleworth is the fact that under the new rules lately applied to covenanted officers of the Department, the latter are debarred from all prospect of a similar concession.

It is a question too whether such an act will not involve a breach of faith on the part of Government towards the officers now being trained at Cooper's Hill, who will enter the service under the idea that the rules under which they joined are now being applied.

Bombay Officer.

III.—OFFICIAL PAPERS & INTELLIGENCE

Experiments on the Calorific power of Woods.

We have received from the Inspector-General of Forests, for publication, a copy of the correspondence relating to the experiments made in the Agricultural Chemist's Laboratory in Dehra on this subject. The following were the woods experimented on :—

Sal,	Shorea robusta,	From the Dehra Dun Forests
Sain,	Terminalia tomentosa,	
Jaman,	Eugenia Jambolana,	
Dhaura,	Lagerströmia parviflora,	
Safed Siris,	Albizzia procera,	
Kharshu	Quercus semecarpifolia,	From the hill forests of Jaunsar.
Moru,	„ dilatata,	
Ban,	„ incana,	
Chir,	Pinus longifolia,	
Kail,	Pinus excelsa,	
Rai,	Abies Smithiana,	
Morinda	„ Webbiana,	

A specimen of surface coal from the Dun, found in the School Museum, was also analysed. The calorific power of pine wood was the greatest of all the specimens tried. Then came the firs, then the oaks, then Sal and the plains trees, the last being Dhaura.

In regard to the Dun woods Dr. Leather wrote :—

"I have the honour to forward you the results of my determinations of the calorific power of the five samples of charcoal and of the sample of coal sent to me for that purpose.

'2. As will be seen from the figures appended ("evaporative power" of the the five samples of charcoal) the variation is not great, the lowest value being 12·34 for Dhaura, and the highest 13·32 for Sal. Sain charcoal seems to contain a considerable amount of "ash," *i.e.*, mineral matters, and this *might* prove a disadvantage, if the charcoal were employed in a furnace. The point could, however, only be determined from working on the manufacturing scale.

'3. The coal has a very much lower evaporative power than the charcoals:—

	Charcoal.					Coal.
	Sal.	Sain.	Jaman.	Dhaura.	Safed Siris.	Dehra Dun Coal.
Moisture ...	5·75	7·42	7·26	10·95	6 84	3·75
Carbon & other organic matters ..	91·10	83·66	89·66	86·15	89·56	
Ash ...	3·15	8·92	3·08	2·90	3·60	6·95
	100·00	100·00	100·00	100·00	100·00	
Calorific power (pure c=100) ...	88·80	84·90	85·40	82·30	86·90	76.90
Evaporative power... (—lbs. of water at 212°F evaporated by 1 lb. fuel.	13·32	12·73	12·81	12·34	13·04	10·54

And in respect to those of Jaunsar, he reported:—

"I have the honour to submit herewith the results of the 'determinations of calorific power and the analysis of the seven 'samples of charcoal handed to the Assistant Agricultural Chemist 'in December, 1893."

CHARCOAL.

	Kharshu.	Moru.	Ban.	Chir.	Kail.	Rai.	Morinda.
Moisture ...	5·85	2·35	4·75	4·15	2·55	4·35	2·15
Carbon, &c. ...	92·05	92·10	91·30	94·65	97·10	90·80	96·80
Ash ...	2·10	5·55	3·95	1·20	0·35	4·85	1·05
	100·00	100·00	100·00	100 00	100·0	100·00	100·00
Calorific power pure carbon—100 ...	93·08	91·23	90·77	97·85	96·92	93·85	95·38
Evaporative power—lbs. of water at 212°F evaporated by 1 lb. fuel. ...	13·96	13·68	13·62	14·78	14·56	14·08	14·30

Reissue of the 'Annales forestieres' or 'Revue des Eaux et Forêts.'

We have been asked to make it known to our readers that the Editor of the *Annales Forestières*, which comprises the '*Révue des Eaux et Forêts*' and the '*Répertoire de Legislation et Jurisprudence*' have been reissued, and that nearly complete sets of the publication for the years 1862 to 1893 are now available at the extremely moderate rate of 18 francs the set of 30 volumes. To those who regularly read the excellent forest periodical now edited by Mons. C. Broillard, late Nancy Professor and Conservator of Forests, it is astonishing that the price of 30 or 31 years' issue can be kept down to such a low figure as this; and we recommend those of our readers who would like to possesss the set, not to lose the present opportunity. At the request of the Inspector-General of Forests we may say that we shall be glad to receive indents and the necessary money from intending purchasers, and to procure the books. There will be, of course, in addition to the 18 francs, a small sum for cost of transport, which can be divided afterwards among those

who have indented and recovered from them when sending the books, by the V. P. Post. As we are sure it will be interesting, we add here, in the original French, the letter of the Editor to Her Majesty's Secretary of State on the subject :—

Monsieur le Secrétaire,

Permettez-moi de vous soumettre une proposition que j'ai déjà faite au Gouvernement belge, et qui a été trés favorablement accueillie par la Direction des Eaux et Forêts et par les Agents.

Depuis plus de 50 ans nous publions une Revue forestière, le seul organe français qui tienne au courant des progrès de la Sylviculture.

La première série, publiée sous le titre (Annales forestières,) et finissant avec l'année 1861, est depuis 30 ans épuisée. Une nouvelle série fut commencée en 1862; elle a pour titre, Revue des Eaux et Forêts, et elle est arrivée à sa 31ème année d'existence.

Nous avions offert au Ministère belge de lui céder, au prix de 18 fr. seulement, c'est a dire au prix d'abonnement d'une seule année, autant de collections qu'il nous était possible de composer en 40 volumes et d'avantage, compris parmi les années 1862 à 1892. Il a demandé 45 Collections que nous lui avons expédiées, frais de port, a la charge du Gouvernement belge.

Je prends la liberté de vous faire une proposition analogue, c'est à dire de vous livrer autant de Collections qu'il nous sera possible de composer en 30 volumes et au delà (Revue et Jurisprudence), commençant en 1862 et allant en 1892, et de vous les céder à 18 fr. la Collection au lieu de 300 fr., prix réel d'une Collection de 30 volumes.

Vous pourriez ainsi distribuer admettons 60 Collections de la Revue et du Répertoire à 1,080 fr. au lieu de 36,000 fr.

Il y a des volumes qui ont été épuisés par l'acquisition de la Belgique ; c'est la raison pourquoi j'offire des Collections allant seulement de 30 à 40 volumes.

Dans tous les cas, le prix de 18 fr. représente à peine le prix de la brochure et la valeur des volumes comme vieux papier.

Je suis persuadé, Monsieur le Secrétaire, qu'en distribuant à ce prix modeste une des meilleures Revues forestières qui existent, votre haute Administration contribuera à répandre le gout de la Sylviculture, en mettant entre les mains des Agents aux Indes, un excellent Recueil de Science forestière, de Legislation, et de Jurisprudence.

Je joindrai en plusgratuitement à chaque Collection, la table alphabétique des Matières que je prends la liberté de vous adresser sous bande par la poste.

La Direction Belge des Eaux et Forêts avait adressé une circulaire à tous ses Agents, afin de connaître ceux qui désireraient acquérir des Collections de la Revue.

Elle a réuni toutes les demandes, elle a reçu et distribué les Collections, et c'est elle qui m'a fait verser le montant aprés paiement obtenu de ses agents.

Je pense que le Gouvernement des Indes en agissant de même, rendra un véritable service aux nombreux Agents qui ont reçu leur instruction à l'école forestière de Nancy, et qui trouveront dans notre Revue un enseignement excellent applicable à leurs travaux journalières. Votre haute Administration n'aura ainsi que les frais de port, et la peine de faire distribuer les Collections.

J'ose espérer, Monsieur le Secrétaire, que vous voudrez bien accueillir favorablement ma demande, et,

J'ai l'honneur d'être, avec l'expression du plus profond respect,

Votre tout devoué

Paris, le 30 Juin 1893, T. ROTHSCHILD,

1£, Rue des Saints Péres. Editeur.

IV.—REVIEWS.

New Works on Forest Law and on Land Revenue Systems.

Mr. B. H. Baden-Powell has added to his many services to the Indian Forest Department and to Forestry in general, by writing an excellent treatise on *Forest Law* (1), unique in the English language, and which will be a standard of reference for the United States of America, and all British colonies, as well as for the British Isles, whenever these countries perceive the necessity for a proper organization of their forests, and wish to follow the example of India as well as of France, Germany and other European countries which have had recourse to forest legislation.

No one could be more thoroughly qualified for the above work than Mr. Baden-Powell. A member of the Bengal Civil Service, he was Conservator of Forests in the Punjab from 1869 to 1880, and from 1872 to 1874 he acted as Inspector-General of Forests, during Sir D. Brandis' absence on leave. He also assisted in drafting the Bill, which subsequently became the Forest Act of 1878, and he drafted the Forest Act of Burma (1881). In 1872 he was sent by the Government of India to Burma to investigate the extensive frauds in the teak timber trade. He left the Indian Forest Department in 1880 on being appointed Officiating Commissioner of Umballa, and he was afterwards raised to the Punjab Chief Court, which position he resigned in 1889 on his retirement on pension. His services to forestry have, however, never ceased, as he gave a course of lectures in Forest Law at the Dehra Dun Forest School in 1881 and every year since 1892, he has given a similar course of lectures to the

(1.) "*Forest Law.*" A course of lectures on Civil and Criminal Law and the law of the Forest (chiefly based on laws in force in British India), by B. H. Baden-Powell, C. I. E., London. Bradbury and Co., Bouverie St. 1893.

Coopers Hill forest students which indeed form the subject of the present book. Mr. Baden-Powell has thus had great experience in the control and working of Indian Forests, besides possessing a most complete and practical legal training, and one of the many benefits for which India has to thank Sir D. Brandis, is that owing to his tact and good judgement, the initiation of the forest legislation in India, and the instruction of the Indian forest staff in the subject, has been placed in such capable hands.

The present octavo volume of 500 pages is intended to replace Mr. Baden-Powell's '*Manual of Forest Jurisprudence*' of 1882, which is out of print, and the subject is now brought up to date, and considerably improved in arrangement and matter. The sketch of Indian Civil Procedure and of the Stamp and Registration Laws which were included in the former work, have now been omitted. The book is divided into 3 parts, each comprising a number of lectures.

Part I gives elementary notions of Civil Law, and in it lecture No. 1 is introductory to the subject. Lecturs 2, 3 and 4 are on the *Law of Persons and Things*, and lectures 5 and 6 on the *Rights of Persons over Things*, including an account of *Mortgage*, *Easements* and *Servitudes*, a detailed knowledge of the latter being so important in forestry.

Part II deals with the *Indian Criminal Law*, including that of *Procedure*, in lectures 7 to 13.

Part III deals with the *Forest Law*, lecture 14 explaining the reasons for a special forest law, and the *topics* it deals with; describing the various Acts and Regulations passed in India, with the exception only of the recent 'Assam Regulation,' which was probably received too late; and giving an account of the Rules which are made under the Acts. Lecture 15 is on State property, and gives an account of the state of the law regarding the right of the State to all waste lands not lawfully occupied; and of the classes of public and acquired property. Lecture 16 explains what lands are subject to the forest law. The important statement is here made that the term *protected forests* was only suggested in the Draft Bill prepared for the Forest Act of 1878 as a temporary expedient, for the framers of the Act considered it impossible to take all State waste land in hand at once and deal with it as Reserved Forests, which entailed a complete enquiry into, and final settlement of, all rights over any forest in question. Their views were unfortunately not accepted, and a class of *protected forests*, not properly or permanently secured, was founded by the Indian Legislature. At the end of this lecture is a valuable Appendix, with a *resumé* of the European law in different countries regarding the control by the State of communal forests and forests belonging to corporate bodies and institutions. Lecture 17 gives the legal steps to be taken in the constitution of forest estates, and lectures 18 to 22 explain forest easements, and how they

may be regulated, or extinguished. An Appendix to Lecture 22 gives an "Abstract of the German Law regarding Regulation and Extinction by Compensation of Forest rights," which is most interesting and deserves careful study, especially in view of cases which may very well occur in parts of India in which the growth of rights, or of privileges amounting to rights, makes their extinction by purchase a necessity if the area concerned is to be maintained at all as a forest estate. Lectures 23 to 25 are of the legal protection of forests and their produce in transit, and the two final lectures 26 and 27 on the legal organization of the Forest Service. We have here a complete and well arranged scheme dealing most thoroughly with forest law, and greatly facilitating its study and practice in India.

The 2nd book before us is a neat little volume in 260 pages with a map of India, showing the areas under the different kinds of land revenue settlements. Mr. Baden-Powell's '*Land systems of British India*' (2) in three large volumes is really intended to act as a Gazetteer for all the provinces in British India, the land systems in each of which are dealt with separately. The present volume gives sufficient practical information to serve as a text book for Forest Officers and others outside the land-revenue department. It consists of two parts: part I, in 5 chapters, gives a general explanation of the Land Revenue of India, including notes on the features of the country, climate and other matters affecting the land revenue administration; the organization of the provinces and districts with reference to it, and finally what lands are liable to pay land revenue, and the rules for the disposal of waste lands.

Part II gives an account of the different tenures of land in British India and the land-revenue systems, including the different settlements with landlords, villagers, or farmers (raiyats) which prevail in different parts of India. The old land revenue was taken in kind on the threshing floor by the Mogul's agents to the extent of one-third, or half, the grain. This payment in kind was afterwards commuted into a money payment, the principle being to take as much as the farmer could stand without being actually rendered a pauper, and unable to cultivate for another year. The British attempts at the settlement of the land revenue are all well described, the permanent settlement of Bengal and Northern Madras, the raiyátwari settlements of Madras and Bombay and the village settlements in Northern India, which are subject to revision every twenty years. The difficulties of the revision which might last four or five years, and upset all the country side, are fully explained, and also the present way of keeping a careful record by means of village officials of all the data of production, and all changes in land ownership which occur, so that land revenue records are always up to date, and a

2. "*Land Revenue in British India.*" By the same. Oxford, Clarendon Press 1894.

revision can be carried out with the minimum of trouble. Curiously enough, Mr. Baden-Powell states (page 50) that land permanently settled is not more valuable, and does not sell for more than land subject to revision of settlement, a strange comment on the folly of the permanent settlement, which forfeited so much national wealth for the profit of the Bengal and Northern Madras land-owners, who after all were originally mere revenue agents.

As regards the proposed cadastral survey of Bihar, so desirable for obtaining useful agricultural statistics and for guiding the action of Government in case of famine, and for protecting the rights of the raiyat, Mr. Baden-Powell thoroughly justifies this measure, and states that the objections to it really rest on the old world relations of Zamindar and Raiyat, under which everything was in the loose and unordered condition dear to oriental managers. The zamindar was then able to do what he liked, and to be absolute master, while the peasant was his slave.

After carefully reading this treatise on the Land Revenue of India, it may be confidently recommended as a most concise and clear account of a very intricate subject.

Report of the Agricultural Chemist to the Government of India for 1892-94.

There is not much in Dr. Leather's Report to interest the readers of our Journal, but we see that he has been very hard at work, and has visited most of the Provinces in India and seen what he can of the systems of agricultural work carried on in each.

We should have liked to hear more of the details of the experiments carried on by Babu Lachman Pershad in Cawnpore and Captain Chapman in Oudh on the reclamation of ravine land, and hope that some day Dr. Leather will tell us what has been done. Under the head of 'Fuel Reserves' mention is made as follows of a private work of which we should like to hear more.

"*Fuel Reserve.*—On a proportion of the land near Cawnpore to 'which reference has been made in paragraph 15, Babu Lachman 'Pershad has established a 'fuel reserve' for the benefit of his 'tenants. Timber was to be cut last year for the first time, and 'at my suggestion Babu Luchman Pershad kindly promised to 'have a record kept of the weight of wood which was obtained 'from the area cut. In a few years valuable information may thus 'be obtained.'

The remarks about *usar* are somewhat disappointing, the only thing that Dr. Leather seems to have ascertained is that under protection from grazing the amount of salts in the soil decreases owing to the opening of the soil by the roots of plants to the passage of water and into it of the soil.

We are glad to see that the work of Mr. S. H. Collins, the Assistant Agricultural Chemist, is specially commended. We are ourselves indebted to him for his valuable researches in regard to Kutch, charcoal and turpentine for the Forest Department.

VI.—EXTRACTS, NOTES AND QUERIES.

Afforestation in the British Isles.

The question of extending the woods of the United Kingdom has recently been brought forward in the Press, and questions have been asked in Parliament as to the willingness of Government to assist in furthering a scheme for stocking certain of our waste lands with trees. Now afforestation may be required owing to those indirect advantages it affords to the climate and soil of a country, which have been described in detail by Dr. Schlich, and again quite recently in Nature, by Dr. Nisbet, or merely to increase the national wealth in forest produce. In our case, forests are certainly not required merely to reduce the air and soil temperatures, or to increase the atmospheric humidity; they may afford useful shelter against the strong westerly gales, or cutting east winds, and in our more mountainous districts they may assist in preventing denudation of the soil, which on a large scale has proved so destructive to agriculture in the Rhone Valley and other regions, but is not very much to be feared in our islands.

The chief use of forests with us is, therefore, for our timber supply, and to render us more independent than at present of imports of this valuable and bulky material, the inland transport of which is so costly. Our mild moist climate is admirably adapted for producing oak, ash, beech, and other broad-leaved timber, as well as larch, silver fir, Scotch pine and spruce; and were the land stocked with trees whenever experience shows that it cannot be profitably used for agriculture, our wealth would be considerably increased, and so would be the demands for agricultural labour.

Exclusive of an import of £3,000,000 worth of teak, mahogany and other tropical woods, which we cannot grow ourselves, we also import annually £12,000,000 worth of oak, ash, and coniferous timber, all of which we might grow at home. Dr. Schlich has estimated that if 6,000,000 acres of our waste lands were planted they would eventually yield sufficient timber to render these latter imports unnecessary. It is even probable that a smaller area would suffice, were the productiveness of our existing woodlands increased by better management.

This extension and improvement of our woodlands is the more urgent, as the forests of Canada, Scandinavia and Russia, from whence most of our timber imports come, are not sufficiently well managed to secure the production of a steady supply of timber for export. The markets for their timber are also extending in France, Italy, the Netherlands, the United States, South Africa and other insufficiently wooded countries. The following table, comparing the ratio of the woodland area in 1892 of our own and

other European countries, with their total area, places us at the bottom of the list:—

Name of country.	Area of forests per 1,000 acres.	Remarks.
	Acres	
Austria-Hungary ...	343	Area of forests less by 102,000 acres since 1872
Russia ...	342	
Germany ...	257	
Sweden and Norway ...	250	
France ...	159	Countries importing more timber than they export
Italy ...	145	
Belgium ...	143	
Holland ...	72	
Denmark ...	60	
British Isles ...	39	

If our present area of woodlands, 3,000,000 acres, were increased by 6,000,000 acres, as proposed by Dr. Schlich, we should still have only 117 acres of woodland per 1,000 acres total area, and should stand between Belgium and Holland on the list.

These 6,000,000 acres would chiefly be taken from our unenclosed mountain and heather land, which, in the agricultural returns for 1892, is given as 12,117,000 acres for Great Britain, figures for Ireland apparently not being available. But as in 1880 there were 4½ million acres of waste land in Ireland, it is probably within the mark to estimate the total area of unenclosed mountain and heather land for the United Kingdom at 15 million acres.

Much of this land is at present used for pasturing sheep, and leased in the Highlands of Scotland at from one to four shillings an acre, according to quality. Large areas of it are also let as deer forests; the rent being fixed at about £25 for each stag which may be shot; and as 2,500 acres will support about 25 deer, five only of which are mature stags, the rent of average deer forests, exclusive of the buildings on them, cannot be more than one shilling an acre. It is the poorer lands at high altitudes, where sheep pasture does not pay, which are generally let as deer forests.

The cost of planting or sowing varies considerably according to circumstances, and is given in Brown's "Forester" (1882) as varying between £3 and £10 an acre, according to the nature of the fencing and draining required, which are the chief items. In calculating the returns from a plantation, the initial cost of planting must be reckoned at 2½ per cent. compound interest up to the date of felling, and this sum deducted from the proceeds of the felling. Any intermediate proceeds from thinnings will of course be added with interest allowed up to the date of the final felling.

Before a land-owner would venture to plant his land on a large scale, he would have to answer the following questions :—

Is the land suitable for the successful growth of any particular forest species, and if so, what are these species, and how should they be grown? Will the sale of the timber be more profitable than the present rent of the land? As a rule, most of these rough pasture lands, except in their moister depressions, are only fit for conifers, and in many cases only for Scotch pine. A large part of the area also is at present stocked with game, and although forest growth may be compatible with pheasants, black game, capercailzie, or a moderate number of deer, it certainly cannot be expected to thrive where rabbits abound ; so that the value of the land as a game-preserve will also intervene.

Experiments might certainly be made to plant up the extensive tracts in the Midlands and elsewhere, which are now encumbered with shale and slag from abandoned ironworks, and which may be bought for an old song. Ash and maple grow well on heaps of slag in the Ardennes, and these species, and probably some others, might certainly be planted on similar areas in our black country. It is true that the cultivation of trees will not prosper within a certain distance from factory chimneys belching out sulphurous and other noxious fumes, but means may be adopted to fix the sulphur within the factory, and to prevent the air from being contaminated; whilst much of the shale and slag is already sufficiently distant from the obnoxious chimneys.

As regards the increased demands which an extended area of woodlands would afford to labour, Dr. Schlich has calculated that if 6,000,000 acres of our waste lands were planted up at the rate of 300,000 acres a year, this would employ annually some 15,000 labourers, and that eventually, once the forests had been grown, about 100,000 labourers would find in them steady employment, besides the large number of hands required by the special forest industries which this large forest area would certainly call into existence.

Such an industry already exists in the chairmaking business of Buckinghamshire. The forests on the Chiltern Hills supply thousands of people with beech-wood, 500,000 cubic feet of which are worked up annually into chairs in the town of High Wycombe and the surrounding villages. Some of these beech forests are getting thin and unproductive, owing to excessive felling and other bad management ; but wherever a moderate amount of care is taken not to overcut the woods, as much as 20s. an acre per annum is obtained, without any expenses for planting, as the beech reproduces itself naturally. The poor dry soil above the chalk, on which the beech thrives, would, if the forest were rooted up and the soil limed at considerable expense, only yield a rental of 12s. an acre as farm-land. Evidently here we have a district where forestry is more productive than agriculture, and where planting

might be extended ; and the same may be said of the large area of heather land above the Bagshot Sands in Surrey, Berkshire, Hampshire, which might all be stocked with conifers were sensible measures adopted to stop the progress of the annual heath fires.

When it is remembered that we import 70,000 tons of pit-props every year, chiefly from the cluster pine forests near Bordeaux, and that in the Belgian Ardennes, at a distance of 80 miles from the coal mines, 40 year old Scotch pine, used for pit-wood, can be sold standing for £55 per acre, exclusive of the value of thinnings, which would pay for the cost of producing and tending the forests, and this means an annual profit of 16s. an acre, including an allowance for compound interest at 3 per cent., there can be no reason why we should not grow our own pit-props on waste land unsuitable for agriculture.

Many farms on heavy land are at present either going out of cultivation or paying very badly, and as an example of the successful forest treatment of similar land on the London clay, the Princes Coverts, near Esher, in Surrey, may be cited.

Leopold of Saxe Coburg, the consort of our Princess Charlotte, and afterwards king of the Belgians, about seventy years ago united several small woodland areas, by planting up the land of two farms, in which they were situated, with hazel and ash coppice and oak standards. The present extent of the coverts is 868 acres, and their yield, after deducting all costs of management, amounts to at least 16s. an acre per annum, and probably more ; but Messrs. Clutton, the agents of the Crown lands, in which these woods are at present included, might supply the correct figures. The coppice is felled every ten years, and yields supports for fruit and ornamental trees, bean and pea-sticks, clothes, props, kindling fuel, &c., which are largely in demand for gardens, orchards, and laundries around London ; while the oaks, which in seventy years attain a girth of about five feet, are readily sold standing at 1s. 6d. and 2s. a cubic foot, according to quality.

Whilst, however, the work of planting up our waste lands must necessarily be chiefly left to private agency, the State should bring the Crown forests into a high state of productiveness, and render them examples of good forest management. Forestry is eminently a practical business, and when a land-owner wishes to plant, he should be able to see the ideal way of dealing with different localities on economic principles in our Crown forests. This at present is far from being the case. Very large sums of public money were spent in planting up the Crown forests in 1813-25, when there was a fear of our running short of timber for the Navy. It is true that our Navy now depends on teak and iron, rather than on oak and pine ; but oak and pine are still valuable commodities, and the present condition of the Crown plantations, made about seventy-five years ago, is certainly not satisfactory, owing to the want of underwood, and the excessive nature

of the thinnings to which they have been subjected. Over an extensive area in the New Forest the Scotch pine masses have been allowed to outgrow the oaks they were intended to shelter temporarily. The fact is, a forester is wanted at the head of our Crown forests, who will see among other things, that they are properly underplanted, and that all blanks are restocked; but in order to do this successfully, the rabbits, which now swarm in some of the woods, must be kept down. This was not the case twenty years ago; but their increase of late has been prodigious, and they not only eat every natural seedling which appears, but also threaten the existence of the older trees by barking them in the winter.

It should be noted that the Crown forests are managed by the State, and their proceeds go into the Treasury, but that the sporting rights in some of them are vested in the Crown. Surely the Royal sportsmen might be contented with a moderate number of rabbits, and with pheasants which do no injury to the woods, and not require the enormous multiplication of rabbits, which no continental prince would suffer in his forests.

It may be objected that by treating our Crown forests for economic forestry, as is the case with the Crown woodlands in other European countries, we should introduce uniformity, and spoil much of their picturesqueness. There are, however, 5,000 acres in Epping Forest, 4,000 in Windsor Park, and extensive tracts in the New Forest, which might be reserved for the lovers of the picturesque, and even then 100,000 acres might be found in the Crown forests which could be made into models of good forest management, which are at present not to be found anywhere in Britain.

W. R. FISHER.

(*In 'Nature' for April 26th 1894.*)

The Planting of waste and unproductive Moorlands in the Highlands.

(From the *Scotsman.*)

To how many of those who know our Scottish Highlands does it occur that those miles and miles of heather, characteristic of our scenery, may not be a natural growth, but, on the contrary, the product of a rude cultivation? Immense tracts in North-Western Europe, once known to have been densely wooded, are now covered with a vegetation in which heather predominates, and though most of us know that in the history of every country man at one time or another destroyed a greater part of its forests, few consider that it is only by continual effort that a forest vegetation is prevented from again taking possession of the soil. Let but nature have her own way with a bit of moorland—she may take ten

or twenty years or much longer to do it, depending on the distance from a forest, character of the soil, and other circumstances—sooner or later there will be found a few firs struggling to gain the ascendency; a few birch, willow, and aspen seedlings scattered amongst the heather. In short, the bit of moorland is becoming a wood. But by periodical burning, the grazing of cattle and sheep, and overstocking with game, all promise of a future forest is choked at its birth. Considering the needs of the present day, are we affecting the balance of nature to our advantage? Competent authorities declared that were nature given a free hand those immense tracts of heather in the north-west of Germany would in time be again clothed with forest. Too much practical value, however, does not attach to the fact, and so there, and in many other parts of the Continent, the forester comes to the assistance of nature, and yearly claims large areas for his operations. What answer should we in Scotland give to the question—Would it be wise to plant on a large scale our waste and unproductive moorlands? The science of forestry has in this country within the last few years made some progress towards attracting the public interest due to it; and, since the subject has lately been mentioned in Parliament, not a few may have sought an answer to such a question. It may be useful, then, to present some arguments of general interest for and against the planting of our heather-clad moors and hillsides.

The private individual will probably first ask, Will it pay? Taking into account cost of planting, rent of land, and so forth, shall I receive a sufficient return in hard cash? This is a most difficult question, and one only to be answered in specific cases. A man who is willing to spend money on the afforestment of waste lands must remember that money thus spent accumulates with compound interest to a large sum in 80 to 100 years, before which time, except in the case of copsewood, he cannot reap his harvest. The result, indeed, often proves that the ultimate profit would have been greater had he received a small annual rent for the land, say for sheep grazing. The very fact that he is making a sacrifice for the benefit of others, that during his lifetime he can hope for no pecuniary return, prevents many a landed proprietor from considering the matter at all. Woods are, however, planted, and where they already exist, preserved, with other objects in view than a mere direct return in money. The beneficial effects of forests on climate—conservation of moisture chiefly—are well-known. Then, in the case of steep mountain sides, the heavy rainfall which on a bare slope would rush down, carrying the soil with it, and swelling the rivers into sudden flood, will, where the slope is covered with forest, disappear in its carpet of moss, leaves, and humus, which, like a huge sponge absorbing many times its own weight in water, forms a reservoir feeding surely and regularly spring and rivulet. In the high Alps a

forest hinders the formation of the dreaded avalanche, and on the coasts of France and Germany the serviceable fir binds the drifting sand. Forests also afford a capital cover to all kinds of game, and what is of great importance in our time, they gave directly and indirectly employment to a considerable population. For these and many other reasons forests are important in the economy of nature and of society. But in favoured Scotland, although her forests are few, the climate, as regards moisture, leave nothing to be desired; the rivers do not in spring come down in disastrous floods, to be dried up for the rest of the year; no avalanches carry death and ruin down the sides of Ben Nevis or Ben Cruachan; nor are there on our coasts thriving villages and prosperous towns in danger of being engulfed by driftsand; it almost seems as if the grounds urged for afforestation in other countries could have no weight with us. Still it would be wrong to suppose that no arguments remained in favour of planting the waste land of this country. There can be no doubt that forests play an important part in improving the soil. They would also add much to the beauty of our scenery, besides affording shelter to various kinds of game. Red deer, it is true, prefer the solitude of corrie and glen to patches of woodland, where they do not feel secure; but the forests, broken only by a few open glades and cultivated clearings, was once their home. Grouse would probably always keep to the open moors, but with roe deer, capercailzie, black game, hares, and rabbits, it is otherwise. Roe deer and capercailzie are no great friends of the forester, but the damage done by them is only serious in the case of small detached plantations. In many well-wooded parts of the Continent both are numerous, yet few complaints are made. Rabbits alone are an unimitigated nuisance, and their numbers must be kept within reasonable limits. At a time when much is heard of the depopulation of the highlands, it is important to remember that the afforestment on a large scale of our waste and unproductive moorlands would now permanently give employment to a large proportion of our crofter population. In winter, when others find work scarce, the woodcutter is fully employed. In spring the work of sowing and planting may largely be entrusted to women and boys. In summer the men can employ their spare time in mending the roads in the forest, putting up fences, and other odd jobs; while in autumn little or no work need be done in the woods, all hands being busy at the harvest. Many of us who have been on the Continent have seen in the Harz mountain, Bavarian Alps, and elsewhere, happy and prosperous villages, the existence of whose inhabitants, the soil fit for the plough being scarce, depends on the employment they find in the surrounding forests. Is there a village in all Scotland where the inhabitants depend on the surrounding grouse moors and deer forests for their existence?

The crofters are in urgent need of some employment to enable them to better their condition: still it would in most cases be unreasonable to expect the private individual who receives a high annual rent for the grouse shooting on his moors to drive away this game planting, thus giving up his certain income for the sake of a mere speculation. If anything of importance is to be done, it must be by means of a Government scheme. Present sacrifices may be necessary, but such a scheme will prove remunerative, provided the operations be conducted on a large scale, and the education and experience of the foresters be such as to ensure that the initial expenses shall be as small as possible, and the result show a crop of valuable timber. Not another country in Europe offers so favourable a field for the operations of afforestation. Seeing it is by no means certain that the countries from which we now draw our timber supplies may not become, at least in part, exhausted, it is high time we gave the matter our earnest consideration. All are agreed that timber can be grown in Scotland as good as any imported; let us hope the day is coming when home requirements will largely be satisfied by home-grown timber.—(*Timber Trades Journal.*)

The Utilisation of waste wood and Sawdust.

The numerous saw-mills and wood-working machines used in the colonies, and in large timber-growing countries generally, find, not infrequently, that there is a difficulty in the disposal of their waste wood and sawdust. In a few large wood-working establishments at home, enterprising proprietors have set up chemical apparatus for utilising these products, and recently Mr. W. Hadfield-Bowers, Brookfield Chemical Works, West Gorton, near Manchester, has introduced a machine for this special purpose. It is known as the "Bowers" Patent Retort and Drying Oven, and has been in use for nearly a year, doing all that is claimed for it in recovering useful products from waste wood and sawdust. The ease with which the apparatus can be set up and manipulated should be an important factor in recommending it to the use of saw-mill owners and wood-working factories abroad. It consists of an iron chamber pierced by a central flue which divides the chamber into two divisions, an upper and a lower. The fire under the bottom plate heats the lower chamber; the waste heat from the lower chamber passes through the central flue and heats the top chamber. The wood or sawdust to be dried or carbonised is fed into a hopper from which it passes automatically to the bottom part of the upper chamber, where it is moved forward by a pair of endless chains carrying bars to the end of the chamber, where the materials fall upon the bed of a lower

chamber, and are slowly conveyed towards the fire end. The chambers are so arranged that there cannot be any escape of vapour; and thus all the pyroligneous products in the drying process are condensed and collected. The apparatus can then be used for thoroughly carbonising the spent material, as well as for the ordinary drying of such substances as spent dye-woods, tanning materials, fossil meal, brewers' grains, &c.—(*Timber Trades Journal.*)

To make the Black Country Green.

A very interesting social experiment has just been conducted by Mr. Fisher, the Assistant Professor of Forestry at Cooper's Hill. Mr. Fisher has inspected a considerable area of what is to outward view the most hideous and forsaken district in England—the Black Country. The soil is covered with the wreckage of abandoned coalpits. The rush of men too hasty to be rich has passed over its acres, and left them black, bare, apparently sterile. But Mr. Fisher is convinced that one or two hardy specimens of trees would flourish there, and that a careful experiment in planting would turn the country green again. The trial would not be costly one. Will not the Government (asks the *Chronicle*), or, failing them, some disciple of Mr. Ruskin, help to recolour at least a few hundred acres of the Black Country?—(*Extract*).

Forestry at the Surveyors' Institution.

An excellent catalogue of the forestry collection at the Surveyors' Institution has been issued, indicating the energy and care with which this useful section of the Institution's work is conducted. Although weak in some classes the collection already gives evidence of its future utility, when it should prove of the greatest value to students preparing for examination for the forestry diploma. The classification is comprehensive, the exhibition being arranged into the following sections, *viz.*, practical forestry, forest produce, scientific forestry, illustrations of forestry, forest literature, and forest economy. These, with their subdivisions, are copiously illustrated, and of the greatest interest to those concerned with the management of woodlands.

The section devoted to economic forestry is of great value, as it deals with the results obtained from planting. Mr. James Price C. E., consulting engineer for railways at Dublin, sends a sample of larch planted in 1861-62 and cut in the spring of 1893. The trees from which this was cut were grown on a loose, rocky soil in Louth Co. The value of the land was about 4*d.* per statute acre. Owing to the droppings and the shelter larch, a fine grass has been grown, and the land is now five times more valuable for pasture than it would have been had the trees never been planted. Some of the trees now measure 3 feet in girth outside the bark. The catalogue states that if two-thirds of these trees were now cut down they would be worth from 1s. 6d. to 2s. each, while the remaining third will be worth 5s. as railway sleepers in twelve years. Another sample in the collection affords almost as interesting a proof of the value of afforestation. This is a specimen of alder planted in 1861-62, and cut last spring. Although grown in poor ground the trees are tall and straight, and some of them measure 14¼ inches in diameter inside the bark.

Home timber merchants and others when in London will be able to spend a profitable hour at the Surveyors' Institution, and some of them might added to the utility and interest of the collection of woods now being got together by sending specimens.—(*Timber Trades Journal.*)

The growth of Trees.

The editor of the U. S. *Monthly Weather Review* comments on a series of measurements of the growth of trees, made by Mr. J. Keuchler, of Gillespie County, Texas, about two hundred miles north-west from the Gulf Coast at Indianola. Mr. Keuchler seems to have adopted the idea that a tree bears the history of its climatic surroundings written in itself, and that its annual rings of growth vary in size mainly with the supply of water to the roots, so that broad rings indicate wet years, and thin rings that can scarcely be distinguished with the naked eye denote dry years. After carefully selecting trees for his measurements, he felled three oaks, two of which were over 130 years old. He cut a perpendicular section from each trunk near the thick end, planed its surface very smooth, and then varnished it over which made the annual rings distinctly visible. From each section a table was prepared of the relative order and position of the annual rings; upon comparing these three tables they were found to correspond exactly, thus indicating that moisture is the principal cause of the difference in the breadth of the rings. Taking

the width of the respective rings as a criterion of moisture the record of 134 years shows six years extremely dry, eight very dry; 19 dry; 17 average; 18 wet; 60 very wet; six extremely wet. The editor of the *Review* points out that the large number of very wet years is not at all in accord with the rainfall records during the years 1840 to 1890, and, in fact, no region on the globe is known where the distribution of the rainfall is similar to that given by these records. It is evident, therefore, that the breadth of the annual rings of growth adopted by Mr. Keuchler as corresponding to dry and average and wet seasons needs considerable modification. The width of the annual rings depend, at least in part, upon evaporation, the sunshine, the temperature, and the distribution of rain in frequent showers or in frequent heavy floods. It is the combination of several favourable meteorological circumstances that must have produced the large number of broad rings which Mr. Keuchler has attributed to 60 very wet years and six other extremely wet years. In fact it is best not to attempt to establish any fine details as to the climate from such a record of tree growth, but to be content with the general statement that there were 14 years during which the climate was unfavourable for the increase of woody fibre, 54 years during which there was an average favourability, and 66 years that produced large growth owing to very favourable conditions. All that can safely be concluded is that during 134 years there were 66 in which the rainfall was well conserved for the use of the tree.—(*Indian Agriculturist.*)

Seeding of Forest Trees.

Mr. G. A. Richardson, Divisional Forest Officer of Buxa, Bengal, writes that the present is a good seed year for Sal. Mr. Nallasawmy Naidu, Divisional Forest Officer of Bellary writes that in 1893-94 *Acacia arabica*, *A. leucophlœa*, and the tamarind seeded profusely. This year *Hardwickia binata*, *Bassia latifolia* and *Diospyros Melanoxylon* are expected to seed abundantly.

In the hills of Jaunsar an abundant crop of deodar seed may be expected in the autumn, and the *Pinus excelsa* is also likely to produce well. The 'Kharshu' Oak (*Quercus semecarpifolia*) has already shed its acorns, many of them actually in germination before falling from the tree.

VII.—TIMBER AND PRODUCE TRADE.

Churchill and Sim's Circular.

6th June 1894.

EAST INDIA TEAK.—The deliveries for the first five months of this year amount to 5,311 loads, and are practically identical with those for the same period of 1893. In May 1,014 loads have been delivered as against 1,444 loads in that month last year. The depression in the ship-building trade remains unaltered, and has induced a disinclination to operate, on the part of buyers of forward cargoes. Governmental demand for war ships, and the spreading use of this wood for house building and general purposes are, however, counterbalancing factors, and at the present level of prices the future market should be fairly assurred.

ROSEWOOD.—The demand is dull and stocks ample.

SATINWOOD.—For figury logs good prices are obtainable.

EBONY.—Small parcels of large, good, logs wood realize fair prices.

PRICE CURRENT.

Indian Teak	per load	£10.	to £16
Satinwood	per foot superfical	6d.	to 12d.
Rosewood	„ ton	£5.	to £8
Ebony	„ ton	£6.	to £8

MARKET RATES OF PRODUCTS.

(*Tropical Agriculturist, June 1894.*)

Cardamoms,	per lb.	2s.	to	2s.6d.
Croton seeds	per cwt.	26s.	to	27s.6d.
Cutch	„	20s.	to	32s.
Gum Arabic, Madras	„	15s.	to	33s.
Gum Kino	„	£15	to	£18
India Rubber, Assam	per lb.	1s.9d.	to	4s.2d.
„ Burma	„	1s.7d.	to	1s.11d.
Myrabolams, Bombay	per cwt	8s.	to	10s.
„ „	„	4s.	to	4s.6d.
„ Godavari	„	6s. 3d.	to	7s.
Nux Vomica, good	„	6s.	to	10s.
Orchella, Ceylon	„	15s.	to	22s.
Redwood	per ton	£3.10s.	to	£4
Sandalwood, logs	„	£35	to	£55
„ chips	„	£9	to	£30

X.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

28*th May*, 1894—No. 397 Home.—Mr. C. G. D. Fordyce, Deputy Conservator of Forests, Port Blair, is appointed to be an Assistant Superintendent in the Settlement, with effect from the 31st December 1892, for so long as he holds his present office, or until further orders.

15*th June*, 1894—No. 630-F.—With reference to the Notification of the Foreign Department, No. 927-G., dated the 7th instant, Mr E. E. Fernandez, Deputy Conservator of Forests, 1st grade, Assam, is granted furlough for two years, under Article 340 (*b*) Civil Service Regulations, with effect from 8th June 1894. Mr. Fernandez availed himself of subsidiary leave from 1st to 7th idem, both dates inclusive.

2.—Madras Gazette.

29*th May*, 1894.—Mr. E. J. D. Pierce, Ranger on Rs. 50, Madura District, is granted privilege leave for three months, under Article 291 of the Civil Service Regulations, from the date on which he may be relieved by his District Forest Officer.

7*th June*, 1894.—The leave of absence sanctioned to Ranger M. Jambunatha Sastriar and notified at page 517, Part II, of the *Fort St. George Gazette* of 3rd April 1894, is further extended up to 25th August 1894 inclusive.

9*th June*, 1894 *No.* 273.—

No.	Name of officer.	Present grade.	Grade to which promoted.	Nature of promotion.	Remarks showing cause of vacancy, &c.
1	Mr. C. D. McArthy	Assistant Conservator of Forests, 1st grade.	Deputy Conservator of Forests, 4th grade.	Permanent	With effect from date Gazette.
2	Mr. C. DuPré Thornton	Do. ...	Do.	Do.	Do.

9*th June*, 1894.—To T. Arumuga Mudaliar, Ranger, 5th grade North Arcot District, for two months, under Article 291 of the Civil Service Regulations, from date of *relief*.

15*th June*, 1894.—Mr. J. Tapp, Forest Ranger, North Arcot District, will continue to act in the 4th grade up to 25th August1894 inclusive, *vice* M. Jambunatha Sastriar on leave.

9th June, 1894.—*No.* 273.—

No.	Name of officer.	District.	Nature of charge.	Remarks.
1	Mr. R. W. Morgan, Deputy Conservator of Forests, 1st grade.	Tinnevelly	District Forest Officer.	To join on return from privilege leave.
2	Mr. C. DuPrè Thornton, Deputy Conservator of Forests, 4th grade.	Vizagapatam ...	Do.	Do.

21*st June*, 1894.—Ranger Narayanaswami Aiyar is transferred from North Arcot to Trichinopoly.

3.—BOMBAY GAZETTE.—

1*st June*, 1894.—No. 4781.—His Excellency the Governor in Council is pleased to attach Mr. G. R. Duxbury, Assistant Conservator of Forests, to the Poona Division for the monsoon months or till further orders

4*th June*, 1894.—No. 4817.—His Excellency the Governor in Council is pleased to confer upon Mr. B. H. Dalal, Extra Assistant Conservator of Forests, 2nd grade, and Divisional Forest Officer, Sukkur, the powers mentioned in Section 67 of the Indian Forest Act, No. VII of 1878, as amended by Section 13 of Act No. V of 1890.

4*th June*, 1894.—No. 4819.—Mr. K. B. Phadke, Extra Assistant Conservator of Forests, 4th grade, and Sub-Divisional Forest Officer, Kalyàn, is allowed privilege leave of absence for two months from 9th May 1894.

5*th June*, 1894.—Messrs. Vishnu Mahadev Tilak and Waman Ramchandra Gaundé respectively delivered over and received charge of the Nasik Sub-Division Forest Office on the 24th May last, before office hours.

9*th June*, 1894.—No. 4971.—Mr. W. S. Hexton. Deputy Conservator of Forests, Sind Circle, is allowed privilege leave of absence for two months and twenty-eight days from 28th June 1894, or from such subsequent date as he may avail himself thereof.

9*th June*, 1894.—No. 4971 A.—His Excellency the Governor in Council is pleased to appoint Mr. G. M. Ryan to act as Deputy Conservator of Forests, Sind Circle, in addition to his own duties, during the absence of Mr. W. S. Hexton on privilege leave or pending further orders.

9*th June*, 1894.—No. 5069.—*Erratum.*—In Government Notification No. 4281, dated 15th May 1894, published at page 446 of the *Bombay Government Gazette* of the 17th idem, Part I, *for* "Mr. E. G. Oliver, on return from leave, to be Working Plans Divisional Forest Officer, Kanara," *read* "Mr. E. G. Oliver, on return from leave, to be Divisional Forest Officer, Working Plans Party No. 1, Southern Circle."

9th June, 1894.—No. 5070.—Mr. V. R. Gaundi, Extra Assistant Conservator of Forests, 1st grade, was appointed to do duty as Divisional Forest Officer, Sholápur, during the absence of Mr. E. G. Oliver, Deputy Conservator of Forests, 4th grade, on privilege leave of absence for one month from 17th April 1894.

12th June, 1894.—Mr. Vishnu Mahadev Tilak, Acting Extra Assistant Conservator of Forests, after having delivered over charge of the Sub-Division Forest Office, Násik, to Mr. Waman Ramchandra Gaunde, reported himself for duty to the Divisional Forest Officer of Poona on the 26th ultimo, before office hours.

14th June, 1824.—Mr. G. R. Duxbury, Assistant Conservator of Forests, who has been attached to the Poona Division under Government Resolution No. 4781, dated 1st instant, reported himself for duty to the Divisional Forest Officer of Poona on the 9th idem, before office hours.

20th June, 1894.—Mr. H. Mitra, Extra Assistant Conservator, delivered over, and Mr. E. G. Oliver, Deputy Conservator, received, charge of the Divisional Forest Office, Working Plans Party No. I, S. C., on the forenoon of the 19th June 1894.

4.—Bengal Gazette.

1st June, 1894.—No. 2910.—In supersession of the orders contained in the Notification No. 2551 For., dated the 8th May 1894, Mr. E. G. Chester, Deputy Conservator of Forests, in charge Singhbhum Forest Division, is granted furlough for one year under Article 340 (*b*) of the Civil Service Regulations, with effect from the 10th May 1894.

1st June, 1894.—No. 2911.—Mr. W. H. Lovegrove, Assistant Conservator of Forests, attached to the Singhbhum Forest Division, is placed in charge of that Division, with effect from the afternoon of the 9th May 1894, *vice*, Mr. Chester, on furlough.

18th June, 1894.—No. 199T.—Mr. C. A. G. Lillingston, Deputy Conservator of Forests, attached to the Darjeeling Division, is transferred to the Direction Division and appointed Personal Assistant to the Conservator of Forests, Bengal, with effect from the 1st June 1894.

25th June, 1894.—No. 1032.—The report of the Central Examination Committee having been received, the result of the Half-yearly Departmental Examination of Assistant Magistrates and others, held in May 1894, is published for general information :—

1. Mr. A. H. Mee, Extra Assistant Conservator of Forests, has passed in Forest Law.

2. Mr. E P. Stebbing, Assistant Conservator of Forests, has passed in Forest Law and Forest Procedure and Accounts.

3. Mr. F. Trafford, Assistant Conservator of Forests, has passed in Forest Law.

5.—N.-W. P. and Oudh Gazette.

12th June, 1894.—No. 1983.—Pandit Raghu Nath Pathak, Extra Assistant Conservator of Forests, from the Direction to the Garhwál Division of the Central Circle.

12*th June*, 1894.—No. 1986.—Mr. E. L. Haslett, Extra Assistant Conservator of Forests, from the Direction to the the Naini Tal Division of the Central Circle.

16*th June*, 1894.—No. 2035.—The undermentioned officer has been granted by Her Majesty's Secretary of State for India extension of leave :—

Name.	Service.	Appointment.	Period and nature of leave.
Mr. L. Mercer	Forest	Deputy Conservator of Forests.	Three months' leave on medical certificate.

25*th June*, 1894.—No. 2119.—Pundit Sadanand, Extra Assistant Conservator of Forests, from the charge of the Dehra Dún Forest Division to that of the Saharanpur Forest Division, in the Schoôl Circle.

25*th June*, 1894.—No. 2123.—Mr. H. G. Billson, Assistant Conservator of Forests, attached to the Direction Division of the School Circle, to the charge of the Dehra Dun Forest Division.

6.—PUNJAB GAZETTE.

25*th June*, 1894.—No. 343.—With reference to Punjab Government Notification No. 229 of 11th April 1894, Bhái Sádhu Singh, Extra Assistant Conservator of Forests, on termination of his duties in connection with the Forest Settlement of Rakhs in the Shahpur District, is posted to the Hazára Forest Division, with effect from the forenoon of the 5th May 1894.

25*th June* 1894.—No. 344—Consequent on the promotion of Mr. J. A. McKee, Deputy Conservator of Forests, 1st grade, to Conservator of Forests, 3rd grade (*vide Government of India Gazette* Notification No. 448 F. of 3rd May 1894), and on the transfer of one post of Deputy Conservator of Forests, 4th grade, from the list of Forest Officers in the amalgamated provinces (*vide* orders contained in Government of India No. 276 F., dated 24th February 1894 to Secretary to Chief Commissioner, Central Provinces) the following changes will have effect from the 23rd of February 1894 :—

Mr. G. G. Minniken, Provisional Deputy Conservator of Forests, 1st grade, to be Deputy Conservator of Forests, 1st grade.

Mr. W. P. Thomas, Officiating Deputy Conservator of Forests, 1st grade, to be Provisional Deputy Conservator of Forests, 1st grade.

Mr. G. F. Prevost, Provisional Deputy Conservator of Forests, 2nd grade, to be Deputy Conservator of Forests, 2nd grade.

Mr. J. Ballantine, Deputy Conservator of Forests, 3rd grade, on furlough, to be Provisional Deputy Conservator of Forests, 2nd grade.

Mr. J. H. Lace, Provisional Deputy Conservator of Forests, 3rd grade, on furlough, to be Deputy Conservator of Forests, 3rd grade.

Mr. L. G. Smith, Officiating Deputy Conservator of Forests, 3rd grade, to be Provisional Deputy Conservator of Forests, 3rd grade.

Mr. C. P. Fisher, on privilege leave, Officiating Deputy Conservator of Forests, 4th grade, to be Assistant Conservator of Forests, 1st grade.

Mr. A. V. Mohro, Officiating Deputy Conservator of Forests, 4th grade, to be Assistant Conservator of Forests, 1st grade.

25*th June* 1894.—No. 346.—Consequent on the appointment of Mr. E. Forrest, Officiating Deputy Conservator of Forests, 1st grade, to officiate as Conservator of Forests, 3rd grade (*vide Government of India Gazette* Notification No. 443-F., dated 3rd May 1894,) the following promotions will have effect from the 26th February 1894 :—.

Mr. L. A. W Rind, Deputy Conservator of Forests, 2nd grade, to officiate as Deputy Conservator of Forests, 1st grade.

Mr. A. M. Reuther, Deputy Conservator of Forests, 3rd grade, to officiate as Deputy Conservator of Forests, 2nd grade.

Mr. H. A. Hoghton, Deputy Conservator of Forests, 4th grade, to officiate as Deputy Conservator of Forests, 3rd grade.

Mr. C. P. Fisher, on privilege leave, Assistant Conservator of Forests, 1st grade, to officiate as Deputy Conservator of Forests, 4th grade.

Mr. A. V. Monro, Assistant Conservator of Forests, 1st grade, to officiate as Deputy Conservator of Forests, 4th grade.

25*th June* 1894.—No, 347.—Mr. P. H. Clutterbuck, Provisional Assistant Conservator of Forests, 1st grade, proceeded on special leave for six months, with effect from the 5th March 1894.

25*th June* 1894.—No. 348.—Consequent on the departure on privilege leave for 2 months and 27 days of Mr. L. A. W. Rind, Officiating Deputy Conservator or Forests, 1st grade, the following promotions shall have effect from the 9th March 1894 :—

Mr. F. O. Lemarchand, Deputy Conservator of Forests, 2nd grade, to Officiating Deputy Conservator of Forests, 1st grade,

Mr. L. G. Smith, Provisional Deputy Conservator of Forests, 3rd grade, to officiate in addition as Deputy Conservator of Forests, 2nd grade.

Mr. H. Calthrop, Deputy Conservator of Frrests, 4th grade, to officiate as Deputy Conservator of Forests, 3rd grade.

Mr. A. W. Blunt, Assistant Conservator of Forests, 1st grade, to officiate as Deputy Conservator of Forests, 4th grade.

25*th June* 1894.—No. 349.—Consequent on the departure on furlough for one year of Mr. W. P. Thomas, Provisional Deputy Conservator of Forests, 1st grade, the following promotions shall have effect from 24th March 1894 :—

Mr. G. F. Prevost, Deputy Conservator of Forests, 2nd grade, to Officiating Deputy Conservator of Forests, 1st grade.

Mr. H. Moore, Officiating Deputy Conservator of Forests, 3rd grade, to Officiating Deputy Conservator of Forests, 2nd grade.

Mr. F. C. Hicks, Provisional Deputy Conservator of Forests, 4th grade, to officiate in addition as Deputy Conservator of Forests, 3rd grade.

Mr. A. M. F. Caccia, Officiating Assistant Conservator of Forests, 1st grade, to Officiating Deputy Conservator of Forests, 4th grade.

25*th June* 1894,—No. 350.—Consequent on the reversion of Mr. E. Forrest, Officiating Conservator, to his substantive appointment, and

on the promotion of Mr. C. F. Elliott, Deputy Conservator, 1st grade, to Officiating Conservator, 3rd grade (*vide* Government of India Notification No. 443 F., dated 3rd May 1894).

Mr. E. Forrest, Deputy Conservator of Forests, 2nd grade, to officiate as Deputy Conservator of Forests, 1st grade, with effect from 1st April 1894.

25th June 1894.—No. 351.—Mr. F. B. Dickinson, Deputy Conservator of Forests, 1st grade, returned from one year's furlough on 9th April 1394, and was appointed to officiate as Conservator of Forests, 3rd grade, from that date (*vide* Government of India Notification No. 459 F., dated 3rd May 1894.)

25th June 1894.—No. 352.—Consequent on the return of Mr. C. P. Fisher, Officiating Deputy Conservator of Forests, 4th grade, from privilege leave the following reversion shall have effect from 12th April 1894 :—

Mr. A. M. F. Caccia, Officiating Deputy Conservator of Forests, 4th grade, to Officiating Assistant Conservator of Forests, 1st grade.

25th June 1894.—No. 353.—Consequent on the return of Mr. L. A. W. Rind, Officiating Deputy Conservator of Forests, 1st grade, from privilege leave, the following reversions shall have effect from 6th June 1894:—

Mr. G. F. Prevost, Officiating Deputy Conservator of Forests, 1st grade, to Deputy Conservator of Forests, 2nd grade.

Mr. H. Moore, Officiating Deputy Conservator of Forests, 2nd grade, to Officiating Deputy Conservator of Forests, 3rd grade.

Mr. F. C. Hicks, Provisional Deputy Conservator of Forests, 4th grade, and Officiating Deputy Conservator of Forests, 3rd grade, to Provisional Deputy Conservator of Forests, 4th grade.

Mr. A. W. Blunt, Officiating Deputy Conservator of Forests, 4th grade, to Assistant Conservator of Forests, 1st grade.

25th June 1894.—No. 354.—Consequent on the departure on one year's furlough of Mr. H. A. Hoghton, Deputy Conservator of Forests, 4th grade, and Officiating Deputy Conservator of Forests, 3rd grade, the following promotions shall have effect from 9th June 1894 :—

Mr. F. C. Hicks, Provisional Deputy Conservator of Forests, 4th grade, to officiate in addition as Deputy Conservator of Forests, 3rd grade.

Mr. A. W. Blunt, Assistant Conservator of Forests, 1st grade, to Officiating Deputy Conservator of Forests, 4th grade.

7—CENTRAL PROVINCES GAZETTE.

29th May 1894.—No. 1.—The following passed stipendiary student of the Imperial Forest School, Dehra Dun, having complied with the conditions laid down in Section 29 (1) of the Forest Department Code, 4th Edition, is appointed a Forest Ranger, 6th grade, on a salary of Rs. 50 per mensem, with effect from the 1st April 1894, and is posted to the Forest Division noted against his name :—

Vithal Dhondu ... Nagpur-Wardha.

29th May 1894.—No. 2.—The following passed private student of the Imperial Forest School, Dehra Dun, having complied with the conditions laid down in Section 29 (1) of the Forest Department Code,

4th Edition, is appointed a Forest Ranger, 6th grade, on probation, on a salary of Rs. 50 per mensem, with effect from the 17th May 1894, and is posted to the Forest Division noted against his name :—

K. Rama Rao ... Chanda.

5*th June* 1894.—No. 2624.—Furlough for one year, under Article 840 (*b*) of the Civil Service Regulations, is granted to Mr. H. A. Hoghton, Deputy Conservator of Forests, Seoni Division, with effect from the 1st June 1894, or from the subsequent date on which he may avail himself of it.

7*th June* 1894.—No. 2639.—Mr. R. C. Milward, Assistant Conservator of Forests and Working-Plans Assistant, Betul Forest Division, is transferred in the same capacity to the Hoshangabad Forests Division.

20*th June* 1894.—No. 2802.—On return from the privilege leave granted him by Order No. 636, dated the 8th February last, Mr. A. L. W. Rind, Deputy Conservator of Forests in the Northern Circle, is posted to the charge of the Seoni Forest Division in the Southern Circle, Central Provinces, *vice* Mr. H. A. Hoghton, Deputy Conservator of Forests proceeding on furlough.

21*st June* 1894.—No. 2806.—Mr. H. A. Hoghton, Deputy Conservator of Forests, Seoni, availed himself, on the forenoon of the 9th June 1894, of subsidiary leave preparatory to the one year's furlough granted him by Order No. 2624, dated the 5th June 1894, making over charge of the Seoni Forest Division to the Deputy Commissioner, Seoni.

21*st June* 1894.—No. 2841.—With reference to Order No. 2802, dated the 20th instant, Mr. L. A. W. Rind, Deputy Conservator of Forests, assumed charge of the Seoni Forest Division on the forenoon of the 15th instant.

14*th June* 1894.—No. 3.—With the previous approval and sanction of the Chief Commissioner, Central Provinces, Mr. J. D. St. Joseph, Forest Ranger, 6th grade, in the Betul Forest Division, is appointed as a Working-Plans Assistant, Betul, with effect from the 12th May 1894, *vice* Mr. Milward, Assistant Conservator of Forests and Working-Plans Assistant, transferred in the same capacity to the Hoshangabad Division.

8—Burma Gazette.

19*th May* 1894. No. 206.—The following transfers of officers of the Forest Department in the Upper Chindwin Forest division are ordered :—

Mr. H. H. Forteath, Assistant Conservator of Forests, from Paungbyin to the charge of the Kindat Revenue subdivision.

Mr. C. W. Allan, Extra Assistant Conservator of Forests, on being relieved by Mr. H. H. Forteath, Assistant Conservator of Forests, to the charge of the Paungbyin subdivision.

19*th May* 1894, No. 207—Under the provision of Article 282 (*a*) (1) of the Civil Service Regulation, privilege leave for three months and 15 days is granted to Mr. W. F. L. Tottenham, Officiating Deputy Conservator of Forests, with effect from the 31st May 1894, or the subsequent date on which he may avail himself of it.

19*th May*, 1894, No. 208.—Mr. H. Carter, Officiating Deputy Conservator of Forests, is transferred from the Working Plans division to the charge of the Pegu Forest division, *vice* Mr. Tottenham, proceeding on leave.

21*st May* 1894, No. 211.—In this Department Notification No. 183 (Forests), dated the 9th May 1894, *for* the words "1st June 1894" *read* "30th May 1894."

24*th May* 1894, No. 212.—Mr. T. A. Hauxwell, Deputy Conservator of Forests, is posted as a temporary measure to the charge of the Kado Forest division in addition to his other duties.

24*th May* 1894, No. 213.—Under the provisions of Article 282 (*a*) (*i*) of the Civil Service Regulations privilege leave for three months and 15 days is granted to Mr. G. R. Long, Assistant Conservator of Forests, with effect from the 1st June 1894, or the subsequent date on which he may avail himself of it.

24*th May* 1894, No 214—In exercise of the powers conferred by section 70 of the Burma Forest Act, 1881, the Chief Commissioner withdraws from Mr. L. D'Rozario, Forest Ranger, 1st grade, Salween-Attaran division, Tenasserim Circle, the powers with which he was specially invested in Revenue Department Notification No. 119 (Forests), dated the 21st August 1889.

24*th May* 1894, No. 215.—In exercise of the powers conferred by section 70 of the Burma Forest Act, 1881, the Chief Commissioner invests Maung Charlie, Forest Ranger, 5th grade, Kado division, with the following powers, that is to say :—

(1) The powers of a Civil Court to compel the attendance of witnesses and the production of documents.

(2) Power to issue search warrants under Code of Criminal Procedure.

(3) Power to hold enquiries into forest offences, and in the course of such enquiries to receive and record evidence.

25*th May* 1894, No. 217.—Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, is placed under suspension, with effect from the date of this order.

29*th May* 1894. No. 222.—The following alterations in rank are ordered in the Forest Department:—

(1) With effect from the 6th February 1894, the date on which Mr. H N. Thompson, Assistant Conservator, 2nd (officiating 1st) grade, returned from privilege leave.

Mr. H. H. Forteath, Assistant Conservator, 2nd (officiating 1st) grade, to revert to his substantive appointment.

(2) With effect from the 1st March 1894, the date on which Major C. T. Bingham availed himself of privilege leave:

Mr. C. E. Muriel, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

Mr. E. A. O'Bryen, Assistant Conservator, 1st grade, to officiate as Deputy Conservator, 4th grade.

Mr. H. H. Forteath, Assistant Conservator, 2nd grade, to officiate as Assistant Conservator, 1st grade.

(3) With effect from the 1st April, the date on which Mr. J. W. Oliver availed himself of leave:

Mr. F. W. Thellusson, Deputy Conservator, 2nd grade, to officiate as Deputy Conservator, 1st grade.

Mr. J. C. Murray, Deputy Conservator, 3rd grade, to officiate as Deputy Conservator, 2nd grade.

Mr. G. Q. Corbett, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

Mr. W. F. L. Tottenham, Assistant Conservator, 1st grade, to officiate as Deputy Conservator, 4th grade.

Mr. G. R. Long, Assistant Conservator, 2nd grade, to officiate as Assistant Conservator, 1st grade.

(4) With effect from the 6th April, the date on which Mr. J. Nisbet was appointed Deputy Director of the Imperial Forest School:—

Mr. T. H. Aplin, Deputy Conservator, 2nd grade, to be Deputy Conservator, 1st grade.

Mr. E. S. Carr, Deputy Conservator, 3rd grade, to be Deputy Conservator, 2nd grade.

Mr. H. B. Anthony, Deputy Conservator, 4th grade, to be Deputy Conservator, 3rd grade.

Mr. F. J. Branthwaite, Assistant Conservator, 1st grade, to be Deputy Conservator, 4th grade.

Mr. C. R. Dun, Assistant Conservator, 2nd grade, to be Assistant Conservator, 1st grade.

Mr. G. R. Long, Assistant Conservator, 2nd (officiating 1st) grade to revert to his substantive appointment.

(5) With effect from the 9th April 1894, the date on which Mr. F. B. Dickinson assumed charge of the Eastern circle:

Mr. T. H. Aplin, Deputy Conservator, 1st grade, Officiating Conservator, to revert to his substantive appointment.

Mr. F. W. Thellusson, Deputy Conservator, 2nd (officiating 1st) grade, to revert to his substantive appointment.

Mr. J. C. Murray, Deputy Conservator, 3rd (officiating 2nd) grade, to revert to his substantive appointment.

Mr. G. Q. Corbett, Deputy Conservator, 4th (officiating 3rd) grade, to revert to his substantive appointment.

Mr. W. F. L. Tottenham, Assistant Conservator, 1st grade, Officiating Deputy Conservator, 4th grade, to revert to his substantive appointment.

Mr. H. H. Forteath, Assistant Conservator, 2nd (officiating 1st) grade, to revert to his substantive appointment.

(6) With effect from the 13th April 1894, the date on which Mr. T. H. Aplin assumed charge of the Tenasserim Circle:

Mr. F. W Thellusson, Deputy Conservator, 2nd grade, to officiate as Deputy Conservator, 1st grade.

Mr. A. Weston, Deputy Conservator, 3rd grade, officiating Conservator, to officiate as Deputy Conservator, 2nd grade.

(7) With effect from the 19th April 1894, the date on which Mr. C H. Hobart-Hampden availed himself of furlough:

Mr. G. Q. Corbett, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

Mr. W. F. L. Tottenham, Assistant Conservator, 1st grade, to officiate as Deputy Conservator, 4th grade.

Mr. H. H. Forteath, Assistant Conservator, 2nd grade, to officiate as Assistant Conservator, 1st grade.

29*th May* 1894, No. 5.—Mr. C. R. Dun, Assistant Conservator of Forests, availed himself of the privilege leave granted to him in Revenue Department Notification No. 183 (Forests), dated the 9th May 1894, on the afternoon of the 29th May 1894.

30*th May* 1894, No. 223.—Mr. H. H. Forteath, Assistant Conservator of Forests, is appointed to be Personal Assistant to the Conservators of Forests, Eastern and Western Circles, and is transferred from Kindat to the charge of the Direction Division, Mandalay, *vice* Mr. C. R. Dun, proceeding on leave.

30*th May* 1894, No 4.—With reference to Revenue Department Notification No. 212 (Forests), dated the 24th May 1894, Mr. A. Weston, Deputy Conservator of Forests, made over, and Mr. T. A. Hauxwell, Deputy Conservator of Forests, received charge of, the Kado division on the afternoon of the 30th May 1894.

31*st May* 1894, No. 228.—Mr. R. F Lowis, Extra Assistant Conservator of Forests, is transferred from the Ruby Mines subdivision of the Katha Forest Division to the charge of the Magwe subdivision of the Minbu Forest Division.

Revenue Department Notification No. 178, dated the 4th May 1894, is hereby cancelled.

2*nd June* 1894, No. 9.—Mr. A. M. Burn-Murdoch, Assistant Conservator of Forests, made over charge, on the afternoon of the 6th May 1894, of the Magwe subdivision, Minbu division, to Forest Ranger Maung Po Tah, as a temporary measure, and availed himself on the forenoon of the 7th May 1894 of the three months and 15 days' privilege leave granted him in Revenue Department Notification No. 177 (Forests), dated the 4th May 1894.

4*th June* 1894. No. 5.—Mr. G. R. Long, Assistant Conservator of Forests, availed himself of the three months and 15 days' privilege leave granted to him in Notification No. 213 (Forests), dated the 24th May 1894, on the afternoon of the 4th June.

6*th June* 1894, No. 11.—With reference to Revenue Department Notification No. 207 (Forests), dated the 19th May 1894, Mr. W. F. L. Tottenham, Officiating Deputy Conservator of Forests, made over, and Mr. H Carter, Officiating Deputy Conservator of Forests received charge of, the Pegu division on the afternoon of the 31st May 1894.

No. 12.—With reference to Revenue Department Notification No. 208 (Forests), dated the 19th May 1894, Mr. H. Carter, officiating Deputy Conservator of Forests, relinquished charge of the Working Plans division on the afternoon of the 31st May 1894.

7*th June* 1894. No. 10.—With reference to Revenue Department Notification No. 206 (Forests), dated the 19th May 1894:—

Mr. H. H. Forteath, Assistant Conservator of Forests, made over, and Mr. C. W. Allan, Extra Assistant Conservator of Forests, received charge of, the Paungbyin subdivision, Upper Chindwin division, on the afternoon of the 28th May 1894.

Mr. C. W. Allen, Extra Assistant Conservator of Forests, made over, and Mr. C. W. A. Bruce, Assistant Conservator of Forests, received charge of, the Kindat revenue subdivision, Upper Chindwin division, on the forenoon of the 31st May 1894.

7th June 1894, No. 11.—With reference to the Revenue Department Notification No. 223 (Forests), dated the 30th May 1894, Mr. H. H. Forteath, Assistant Conservator of Forests, reported his arrival at Mandalay, and assumed charge of the duties as Personal Assistant to the Conservators of Forests, Eastern and Western Circles, on the forenoon of the 7th June 1894.

8th June 1894, No. 235.—The following alterations in rank are ordered in the Forest Department:—

(1) With effect from the 1st April 1894, the date on which Mr. J. W. Oliver availed himself of leave:

Mr. A. F. Gradon, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

(2) With effect from the 9th April 1894, the date on which Mr. F. B. Dickinson assumed charge of the Eastern circle:

Mr. A. F. Gradon, Deputy Conservator, 4th (officiating 3rd) grade, to revert to his substantive appointment.

(3) With effect from the 19th April 1894, the date on which Mr. C. H. Hobart-Hampden availed himself of furlough:

Mr. A. F. Gradon, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

11th June 1894, No. 238.—Under the provisions of Section 69 of the Forest Department Code, examination leave for 10 days is granted to Mr. W. A. Hearsey, Extra Assistant Conservator of Forests, with effect from the 23rd May 1894.

12th June 1894, No. 6.—With reference to Revenue Department Notification No. 217, dated the 25th May 1894, Mr. C. W. B. Anderson made over, and Mr. F. J. Rivett, Forest Ranger took over charge of, the Mandalay Revenue subdivision on the afternoon of the 5th June 1894.

16th June 1894, No. 243.—Under the provisions of Article 282 (*a*) (*i*) of the Civil Service Regulations privilege leave for three months and 15 days is granted to Mr. H. Jackson, Deputy Conservator of Forests, with effect from the 15th July 1894, or the subsequent date on which he may avail himself of it.

19th June 1894, No. 246.—Under the provisions of Article 282 (*a*) (*i*) of the Civil Service Regulations, privilege leave for three months and 15 days is granted to Mr. C. E. Muriel, Deputy Conservator of Forests, with effect from the 1st July 1894, or the subsequent date on which he may avail himself of it.

No. 247.—Mr. S. Carr, Assistant Conservator of Forests, is transferred from Yaméthin to the charge of the Pyinmana Forest division during Mr. Muriel's absence on leave or until further orders.

No. 248.—On being relieved by Major C. T. Bingham of the charge of the Tenasserim Forest Circle Mr T. H. Aplin, Deputy Conservator of Forests, is posted to the charge of the Kado Forest division.

20th June 1894, No. 249.—Mr. W. J. Lane-Ryan, Extra Assistant Conservator of Forests, is transferred from Kyauksè to the Pyinmana Forest sub-division.

No. 252.—The Chief Commissioner directs that from the date of this notification the Myittha-Panlaung subdivision of the Mandalay Forest division shall be known as the Kyauksè sub-division.

9—ASSAM GAZETTE.

29*th May* 1894, No. 3861G.—In consequence of the departure on furlough of Mr. H. G. Young, Deputy Conservator of Forests, 3rd grade (provisional), Mr. T. J. Campbell, Deputy Conservator of Forests, 4th grade, is appointed to officiate, until further orders, as Deputy Conservator of Forests, 3rd grade, with effect from the 4th April 1894.

11*th June* 1894, No. 4188.—With effect from the 11th May 1894, Babu Tara Kisor Gupta, Extra Assistant Conservator, 3rd grade, to be Extra Assistant Conservator, 2nd grade.

15*th June* 1894. No. 4272.—Mr. W. F. Lloyd, Deputy Conservator of Forests, 4th grade, on return from leave, is placed on special duty, and attached to the Office of the Conservator of Forests.

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